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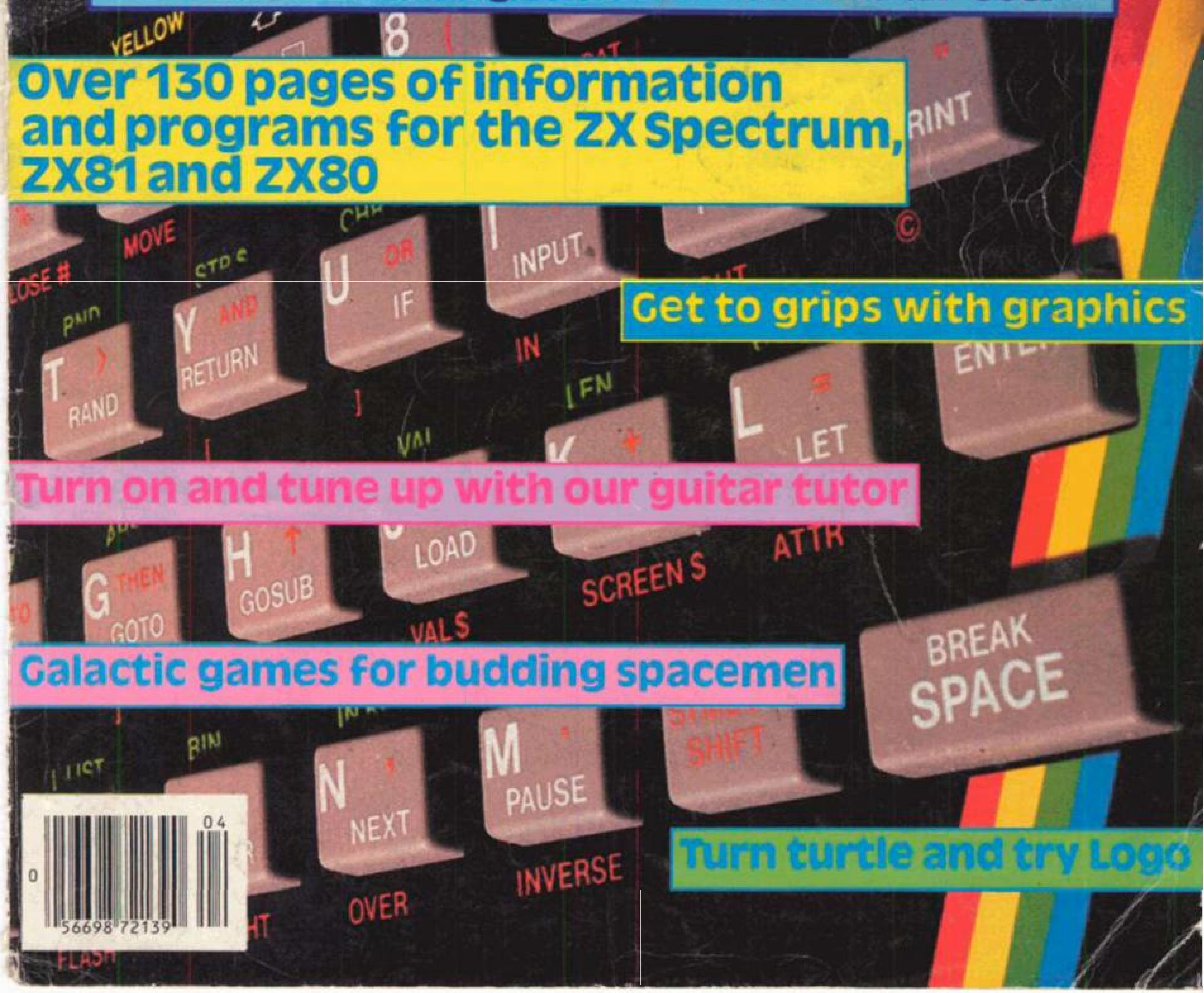
ZX COMPUTING

Apr/May 1984

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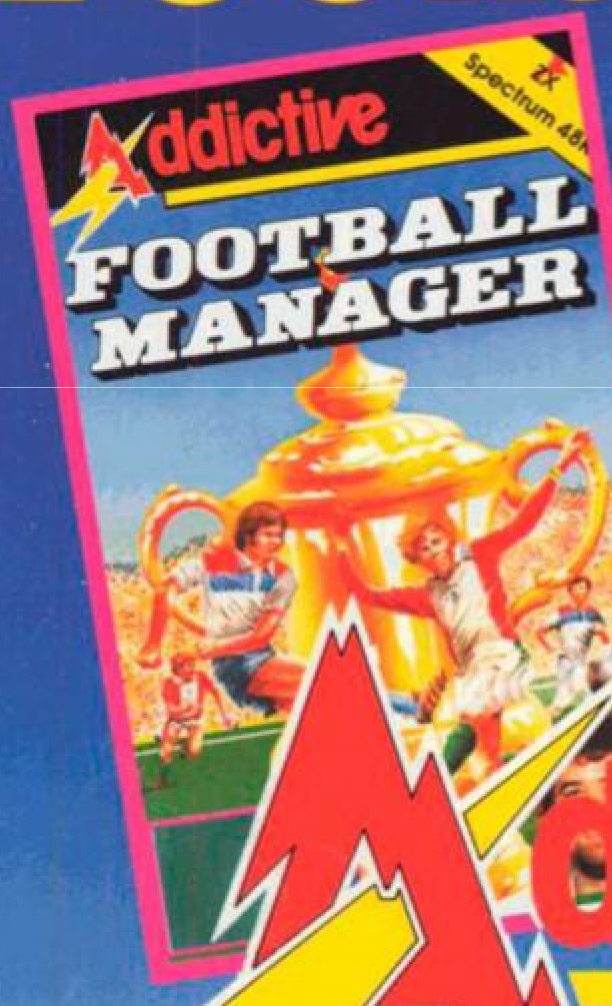
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Kevin Toms

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Addictive

*ZX81 Chart, Home Computing Weekly 16.8.83

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"When I first received this game I spent the best part of the weekend playing it. Since then I have returned to it more often than any other. The truly addictive quality of this game is the remarkable way it mirrors the real football manager's problems ..." (Personal Computer Games – Summer 1983)

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MPUTING

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ZX Computing is constantly on the look-out for well-written articles and programs. If you think that your efforts meet our standards, please feel free to submit your work to us for consideration.

All submitted material should be typed if possible; handwritten work will be considered, but please use your neatest handwriting. Any programs submitted should be listed, a cassette of your program alone will not be considered. All programs must come complete with a full explanation of the operation and, where relevant, the structure; Spectrum programs should be accompanied with a cassette of the program as well as the listing.

All submissions will be acknowledged and any published work will be paid for at competitive rates. All work for consideration should be sent to the Editor at our Golden Square address.

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A FORTH Toolkit (giving floating point etc) and an extension for the Microdrive will be available shortly. 48/80 FORTH uses standard FIG-FORTH definitions with extensions to exploit the special characteristics of the Spectrum, including BEEP (for real arcade quality sound), DRAW, PLOT and CIRCLE.

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This teaching program has already made computing less mysterious for thousands of people. It guides you through the Spectrum 48k memory, teaches you to PEEK and POKE systems variables, shows you how the display file and colour attributes work, how a BASIC program is stored byte by byte, and much much more. Outstanding value for those who get stuck on the second half of the Spectrum manual.

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Welcome

An anniversary

Two years ago this month, I had my first close encounter of the Sinclair kind. The speed of development in the field of home computing has already created a generation gap and many old hands can be heard muttering "I remember when. . ."

Way back in the good(?) old days (1981-2) computers were for the dedicated hobbyist; fanatics huddled in secret dens reading underground publications and wielding unlicenced soldering irons.

Sir Clive, then simply "Uncle" Clive, changed all that with ads in the national press for the ZX81. The result of this flagrant exposure was an interest in the erstwhile 'boffin' magazines and they in turn began to cater for the users of the new machine.

I remember looking for these rare publications lurking at the back of the occasional specialist newsagents, the joy and excitement when one actually featured a 1K ZX81 program! Who cared if it was bug ridden and mediocre — it was recognition!

Then came the advent of the magazine for the "home computer user", two at first, catering for all the machines: one being for games players and the other with a bias toward programming.

A strange phenomena was observed with these generalised magazines — the programs for the other machines always looked better than the ones for your machine. The era of the program converter was born.

At this stage of the proceedings, the breed of computists was special indeed. Owing to late deliveries and especially the infamous RAM pack wobble, programmers tended to be possessed of infinite patience and almost mystical fatalism.

Many names which were to become part of the legend of Sinclairology were born at this stage, often in garages, back rooms and other unlikely places. Names to set the heart pounding, DK'Tronics, Artic, Mikro-Gen, to mention only a few.

I suppose commercialism arrived with the Spectrum. The possibilities for high class pro-



gramming, from games to home business, was soon spotted by the software houses.

Meanwhile, on the publication front, the magazines had expanded and developed into a specialist range. Each of the makes of machine had at least one magazine and in the newsagents, they had emerged from behind the 'glamour' magazines and womens' weeklies and taken over whole counters.

Soon the first colour, full page advert appeared, the era of professional software had arrived. More monthlies, bimonthlies, quarterlies, weeklies: the shelves creaked!

Today's programmer seems to be generally more demanding and less likely to accept delays and problems. Quite rightly too, we have now reached the age of mass production.

Although many bemoan this raising from the level of the specialist to that of the "every home should have one", I continue to be excited by the expanding field of human ingenuity.

The launch of the QL, the latest in the Sinclair range, continues the saga and, whilst I don't long for the "good old days", in the words of the well known welsh comedian, I'm glad that "I was there!"

(Excerpt from "A Biased View" by Ed)

Who and what

Seriously though, this issue is something special. All our regular writers are here plus a few new names to grace the pages of *ZX Computing.*

We welcome and introduce Mike Edmunds who assesses some of the educational software, Clive Smith who looks at the more unusual programs and Colin Christmas, a man of music, who checks out a musical box for the ZX81/Spectrum.

And of course, our readers who provide some of the best programs published. Try Galactoids, a machine code game for any Spectrum which is entered by an easy BASIC program; Datafile, a comprehensive filing program or Guitar tutor, have you ever fancied yourself as a budding Eric Clapton? Programs abound for all tastes; games of logic or reaction, utilities and hints and tips. Also news, reviews — what more could you want? A competition? Of course!

This issue also sees the result of my project to produce a clearer listing printout and I'm sure you'll agree that they are much easier to read. This should mean less eyestrain and less chance of making an error when entering them. I tell you all about how it was set up in this issue, and also how feasible it is to use the Spectrum for word processing.

Service with a smile?

Being a computer nut myself, I often phone companies as a private individual and not in my capacity as Editor. There seems to be a wide range of attitudes between companies and, in general, this tends to reflect on their product.

The next time you decide to spend your well earned cash on that ingenious device advertised in the mags, try giving the company a phone call first to ask for more details. You'll get a good idea of the product from the attitude they adopt on the phone!

I think this ties in with my comments on the development of the market, there are many who are meeting the challenge and are full of enthusiasm and energy but unfortunately, some are still in the back room days.

Contributions

We are always on the lookout for good programs and articles for future issues of *ZX Computing,* and where better to look than to our own readers. If, when reading through the magazine, you think you can write programs as well, or better than, our present contributors, then let's hear from you.

All contributions are, of course, paid for at very competitive rates. So if you've got your eye on a new ZX add-on or you'd just like to supplement your pocket money, get writing! It is vital, though, that all the programs you send us are totally original, and not 'borrowed' or 'adapted' from other magazines or books. (When Tim Hartnell was siting in the Editor's chair, he even received 'original' contributions he himself had written for his own books!)

Any kind of program (business, domestic, educational, or just fun) will be welcomed, but particularly those which use ZX BASIC in clever and efficient ways, or those which employ certain routines which can be re-used on other programs.

Program listings are vital, along with a clear explanation of how the program is constructed, what it does and what the user can expect to see once the program is RUN (a screen dump is particulary valuable in this respect). When submitting Spectrum programs, it is very important to remember to enclose a cassette of the program as well as the listing, as this will allow us to check the program before publication.

The last word

Enough of the introduction, on with the show!

Ray Elder

Home and DI?

Dear ZX Computing,
It was great to see my program, Home Base, published in the Feb/Mar issue of the magazine. However, I have noticed a couple of small faults which I would like to correct.

In line 5, the GO TO 8 can of course be omitted as line 8 comes next anyway! A more serious fault occurs on line 2025 where it reads 7 and not 8. The correct line should be:

LET DI=DI+1:IF DI<8 THEN GO TO 2035

This error means that there would be no level 7. I hope this didn't spoil anyone's enjoyment of the game and apologise.

Yours faithfully,
David Naylor
Leeds



Don't get the hump!

Dear ZX Computing,
Thank you for the review of our utility, Grasp (price £6.50) in the Dec/Jan issue of *ZX Computing*, but you gave us the wrong name! To avoid confusion, it should be Camel Micros (not software) at 33a Commercial Road, Weymouth, Dorset.

Could we also mention that, in response to users' requests, a separate User Guide with fully worked examples should now be available. This will complement the reference manual provided with the cassette.

Yours faithfully,
J R Keneally
Weymouth



Ins and outs of Nuclear Attack

Dear ZX Computing,
I'm sure that many of your readers who typed in the Nuclear Attack game in the Dec/Jan issue will have had trouble with their bombsight and firing. This is because the keyboard scanning system which the author used does not give the same result on all Spectrums. He is not alone, some commercial companies have slipped up on this!

The command which is causing all the problems is the IN function and any program published which uses this is likely to give some people problems. The easiest way to change your program is to check the value returned by the IN function when no key is pressed: the value assumed by the program is 255 but mine returned 191.

To check enter the following line:

9200 PRINT AT 0,0;IN 65278: GO TO 9200

You can have the original program in the computer while you do this if you wish, and type GOTO 9200 newline. The number displayed at the top of the screen is the default or base value; pressing any key on the left-hand half of the bottom row will cause the value displayed to change.

Once you know the base value and the specific values for particular keys then you can adjust the control values accordingly. Replace 65278 with each of the numbers used in the program. (Note 65022 is checked but not used — probably left over from an earlier version and can be left out.) Find out the values for specific keys and then alter lines 135,990,1010 to 1035, 2050.

Here are my alterations based on the base value of 191, if this is the number which your Spectrum produces then you only need to make these changes. 135 and 990 to:

IF IN 65278+IN 64510+IN 57342+IN 49150<764 THEN GO SUB 1000

Delete lines 1010 to 1035 inclusive and replace with:

1010 LET x=x+(IN 64510=187ANDx<30)-(IN 64510=189 AND x>0)
1020 LET y=y-(IN 57342<191 AND y>0)+(IN 49150<191 AND y<19)

Alter line 2050 to:

2050 IF IN 65278<191 THEN GO SUB 6000

I hope that this will help you to get this and other programs working and I would like to say that even with the odd error, I think *ZX Computing* offers the best variety, reviews and all round value of any of the magazines on the market.

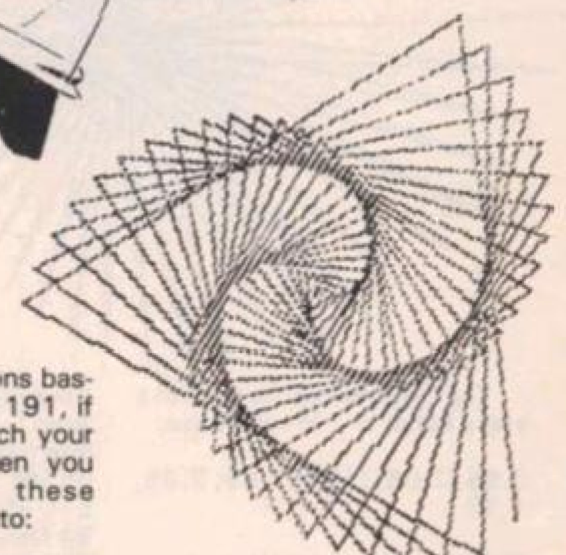
Yours faithfully,
A Herbert.
Somerset

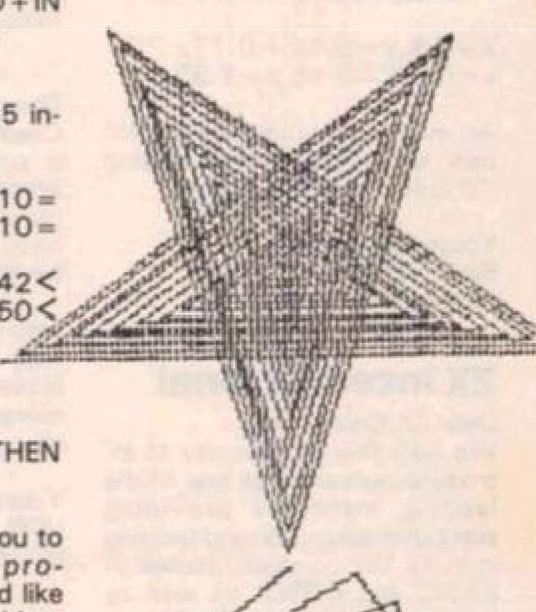
Round and round

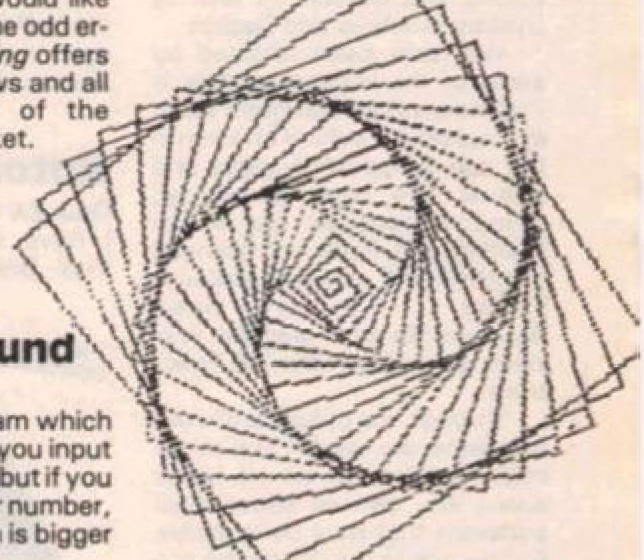
Dear ZX Computing,
I enclose a short program which draws Spirals. Usually you input 1 for the x and y values but if you enter a greater or lesser number, then the pattern drawn is bigger or smaller.

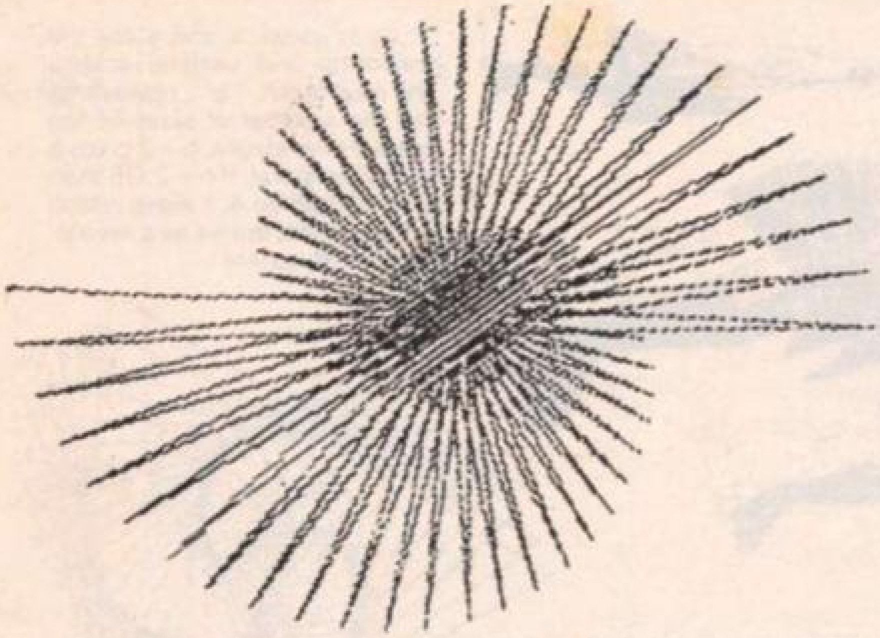
```
 5 INPUT x,y
10 INPUT "A Number please ? ";
p
15 PLOT 128,88
20 FOR a=0 TO 500*PI STEP PI/p
30 DRAW x*a*SIN a,y*a*COS a
40 NEXT a
```

As is usual, x and y are the horizontal and vertical scales. The next input, "p", represents half the number of sides of the spiral. For example, p=2 gives a four sided spiral. If p=2.05 then there should be 4.1 sides which the computer draws as a revolution of the square.









Try these values for p, with x and y equal to 1 in each case:

0.98, 2.05, 0.85, 1.55, 2.35, 1.33

Then try varying x and y eg:

x=0.5,y=0.4,p=0.77;
x=0.2,y=0.15,p=1.33

An even wider range of pattern can be obtained by adding "OVER 1" to the program.

Yours faithfully,
Simon White
Gloucestershire

ZX international

Dear ZX Computing,
We take this opportunity to introduce ourselves as one of the leading institutes providing computer education and training in India. We conduct courses in BASIC and COBOL as well as System Analysis and Design.

We have been retained by some of the leading schools in India to conduct computer training classes for school children in the age group of 8 years and above. We have developed some schedules for these lessons and have commenced experimental classes already. These classes have been designed so that practice sessions are held on the ZX Spectrum.

Through the columns of your magazine we would like to request readers to let us know about any special educational software that may be available for this age group. Since this is a pioneer venture in India where computer training has been introduced at middle school level, we request readers to give special consideration and send us as much material as possible to make this scheme a success.
Thanking you.

Yours faithfully,
Aren Luther, Systems Manager
International Systems Services (P) Ltd
810 Meghdoot
94 Nehru Place
New Delhi
India

Dear ZX Computing,
Could your readers help me with a problem that I have come across? Are there any companies that sell programs of basic or intermediate German for the 16K ZX81?

I would be grateful for any help you may be able to give and may I say many thanks for a brilliant magazine which even manages to find its way to Germany.

Yours faithfully,
LCPL M A Jones
W Germany

We will forward any information from readers that will help Mr Jones with his lanuage problem.

Motor mechanics

Dear ZX Computing,
I have enjoyed Toni Baker's series of articles on machine code and would love a lot more on machine code in future issues.



```
  10 SAVE "CAR RACE" LINE 60
  20 SAVE "race code"CODE 32768,
1020
  30 VERIFY ""
  40 VERIFY ""CODE
  50 STOP
  60 CLEAR 32768: LOAD ""CODE
  70 CLS : PRINT AT 3,1;"CAPS";
AT 4,1;"SHIFT";" = LEFT";AT 3,19
;"BREAK";AT 4,19;"SPACE";" = RIG
HT";AT 7,10;"SYMBOL";AT 8,10;"SH
IFT";" = ACCELERATOR";AT 21,5;"P
RESS ANY KEY TO START"
  80 PAUSE 0
 100 CLS : RANDOMIZE USR 33661
```

Listing to load the machine code in the racing car game, Dec /Jan

Could I point out eight faults in an otherwise superb racing car game in the Dec/Jan issue. All the following is in hex:

1 At address 8103 it should be 69 instead of 49. This produces the correct lower case "i" in "Distance" in the window.
2&3 At address 8164 and 8165 these bytes were missing and should be 11 (Code for PAPER) and 07 (Code for WHITE).
4 At address 82A1 it should be D8 RET C and not C8 RET Z.
5 At address 82C7 there should be a RET instruction eg C9. This one was missing.
6&7 Now comes the crucial mistake that was difficult to find. The call address to the ROM CL-SCROLL for scrolling the lower part of the screen was in the reverse order eg: CD 0E00 which means CALL 000E, and is not the place to call. It should have been CD 000E which calls at address 0E00.
8 The last error is at address 8351 which is C0 meaning RET NZ. It should have been C8 which means, as the mnemonic at the side in the magazine says, RET Z.

Thank you again for a wonderful magazine and I hope these corrections are of help to some of your readers though I think Toni Baker's articles are so good that most of your readers will have worked out the program for themselves.

Yours faithfully,
Adam M Momcilovic
West Yorkshire

Our thanks also to Ray M Tarr of Bracknell and Andrew R Broome of Macclesfield who pointed out these errors in the Dec/Jan issue. Andrew sent in the listing above which loads the machine code, prints screen instructions and starts the program.

Feeling sheepish

Dear ZX Computing,
I think Toni Baker's machine code series has been superb. Once again could I point out several bugs that have crept into the printed version of the Wordsheep program in the Feb/Mar edition of *ZX Computing*.

Starting from page 45, the corrections are as follows:

1 23 instructions after ORG EB00, the mnemonic LDIR is correct but the coding says ED80 which means LDI. This should have read EDB0.
2 On the same page, the first instruction after ORG EB68 reads LD, BC, 0060 which is correct but the two bytes in the coding are the wrong way round. They should be 016000 and not 010060.
3 Over on page 46 the next instruction after A RANDOM should read JR NZ, R RANDOM. The coding, 20FD, is then correct.
4 Seven instructions after TRANSFER U in the next column, the nmemonic LD BC,8003 is correct but the

coding should read 010380 and not 013080.
5 At the third instruction of WIPE, the instruction reads INC DE which should be INC HL. The coding is then right with 23.
6 On page 48, two instructions before PR LOOP, the coding should read 21COEA and not 2100EA.
7 & 8 The last bugs are to be found two instructions after PR_LOOP on page 48 and two instructions after R_FIND_2 on page 49. In both cases the mnemonics should read JRNZ. . . and not JRZ. . .

I hope my letter is of some use to your readers but again, I would imagine that most of them would have been able to debug the program for themselves.

May I suggest that the "YOUR" subroutine in Toni's final paragraph could be a SAVE file routine so that set letters could be SAVEd for further use?

Yours faithfully,
Adam M Momcilovic
West Yorkshire

Our thanks to Mr F J Cooper of Basildon and Patrick Giordmania of E London who also spotted these errors.

New horizons

Dear ZX Computing,
I was interested to see the use made of the large characters routine from the Horizons tape in the Christmas Card program Dec/Jan issue, as I also have been investigating how to use it in my own programs.

The procedure described in the article is fine provided your program runs within the standard 16K. To use it in a larger program requiring the 48K machine, the routine must be relocated higher up the memory, but since there are jumps to specific addresses within the routine certain bytes must be changed.

The simplest procedure I have found is as follows:

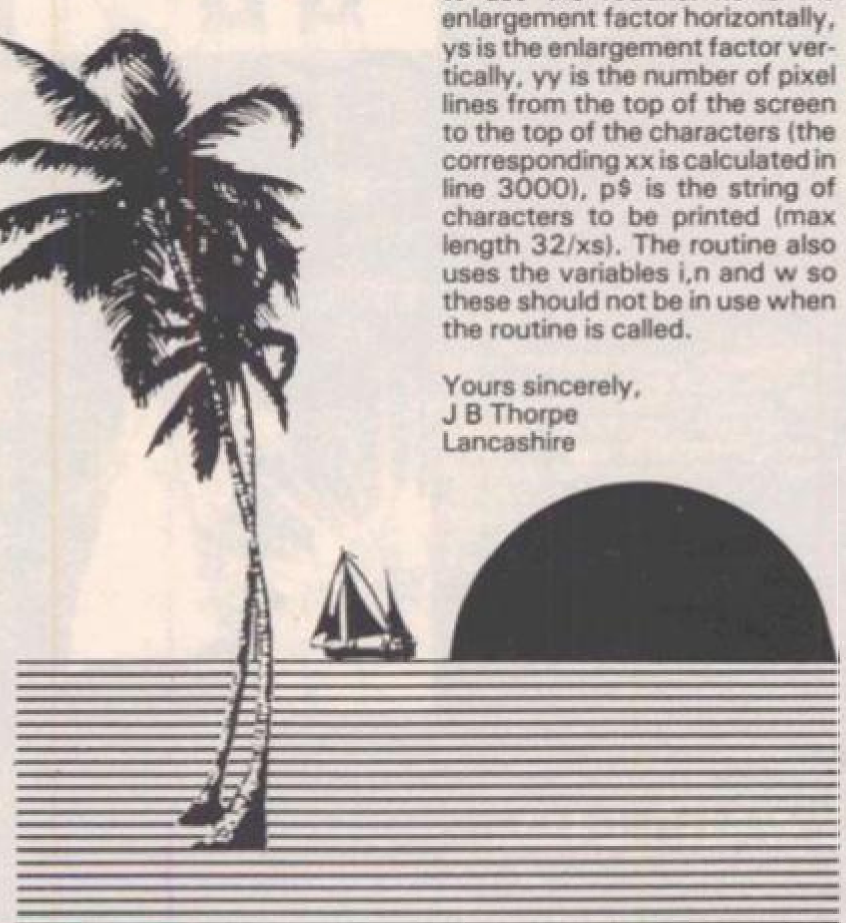
1 Enter CLEAR 65023
2 Find "walls" on HORIZONS but do not load it,
3 Enter LOAD "c"CODE 65024,300 and load the bytes, then
4 POKE the value 254 into the following addresses: 65111, 65131, 65152, 65179 and 65276,

To call the routine incorporate the BASIC subroutine (lines 3000,3010 in Christmas Card) with 32256 changed to 65024 (argument of USR next to last statement). Save after the program by typing SAVE "c"CODE 65024,300 and load by beginning your program (the autorun line) with CLEAR 65023:LOAD "c"CODE 65024.

Of course, if your program runs in 16K it is better to leave the routine at 32256 so that it will work on a 16K machine.

Perhaps it may be useful to set down the variables needed to use the routine. xs is the enlargement factor horizontally, ys is the enlargement factor vertically, yy is the number of pixel lines from the top of the screen to the top of the characters (the corresponding xx is calculated in line 3000), p$ is the string of characters to be printed (max length 32/xs). The routine also uses the variables i,n and w so these should not be in use when the routine is called.

Yours sincerely,
J B Thorpe
Lancashire



Many a slip . . .

Dear ZX Computing,
I received a letter this week from A J Sheasby who thought he had come across a small bug in my program, Valley of Death, in the Feb/Mar issue. I regret to say that he is absolutely right — there *is* a bug which manifests itself only in special circumstances at the very end of the game.

I had fixed this bug even before I sent you the program. Indeed, the fault is cleverly solved by line 765. What is not nearly so clever though is that line 765 is never actually reached! The problem is that, in renumbering the lines just prior to sending you the program I made a careless slip and forgot to alter one of the GOTO statements. The error lies in line 730 which reads:

```
730 IF A(X,V)<>0 THEN
GOTO 770
```

The line should read as follows:

```
730IFA(X,V)<>0 THEN GOTO
765
```

This small change allows line 765 to do its duty in ridding the program of its minor flaw which, admittedly, only crops up on the rarest of occasions.

Thank you for publishing the program and I humbly apologise for the slip-up.

Yours faithfully,
Jerome K Laskowski
London SE6.

Vital statistics

Dear ZX Computing,
Thanks for printing my program, Statistical Analysis for the Spectrum in the Oct/Nov issue of your magazine. However, unfortunately you used notes from an early copy of the program with the updated listing.

The program actually gives you mean, SD, CV(%), SEM, minimum, maximum, median, print/alter data, print ranked data. The tests are regression, correlation, F-test, 2-sample t-test plus graph drawing and bar-chart routines. Any page can be copied by pressing 'c' instead of enter. Data output to the ZX printer is automatic if n is greater than 21, although this could be changed to just PRINT if no printer is available.

The original bubblesort routine I devised was slow as you said, However, I later altered this to a Shell-Metzner type of routine which only takes about three minutes to sort 100 data pairs and not 15 minutes. It is extremely fast for less than 50 data pairs. I hope this did not deter any readers from typing in the program.
NB: CV=Coefficient of variation, not variables.

All the best,
Greg Turnbull
Sunderland

Break in

Dear ZX Computing,
I was messing about one day with the IN statement on my 48K Spectrum and discovered an alternative way to break into a program: pressing keys Z, Symbol Shift and Caps Shift at the same time stops the computer. It then gave the report, L BREAK into program, 10:1.

This is useful if you do not want to use the Break and Caps Shift keys.

Yours faithfully,
Peter Ryan
Middlesex



Sorry!

Danger UXB: Feb/Mar issue.
Unfortunately, the author of this game was incorrectly given as Roger Harmsworth. Our apologies to Mr Mark Harmsworth who should have received the credit for this program.

A slight error crept into the Pelmanism program in the Feb/Mar issue: in line 460 the word copy should be deleted and replaced with the plus (+) sign.

Our apologies for any confusion!

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Alien/Hieroglyphics/Wumpus/Movie — A varied mix from Carnell, all featuring imaginative responses and graphics and all of them good games for all ages (Hieroglyphics is particularly good for children). *Popular Computing Weekly Aug 82*

THE DEVIL RIDES IN

I uttered the last incantations as the clock struck thirteen. All fell silent except for a faint rustling in the corner. From out of the shadows they came, all Hell's fury against me but I was not defenseless until the Angel of Death, astride a winged horse, joined the battle. Avoiding his bolts of hell fire, I took careful aim. My chances were slim, but if my luck held . . .

(Fast moving, machine code, all action, Arcade game)

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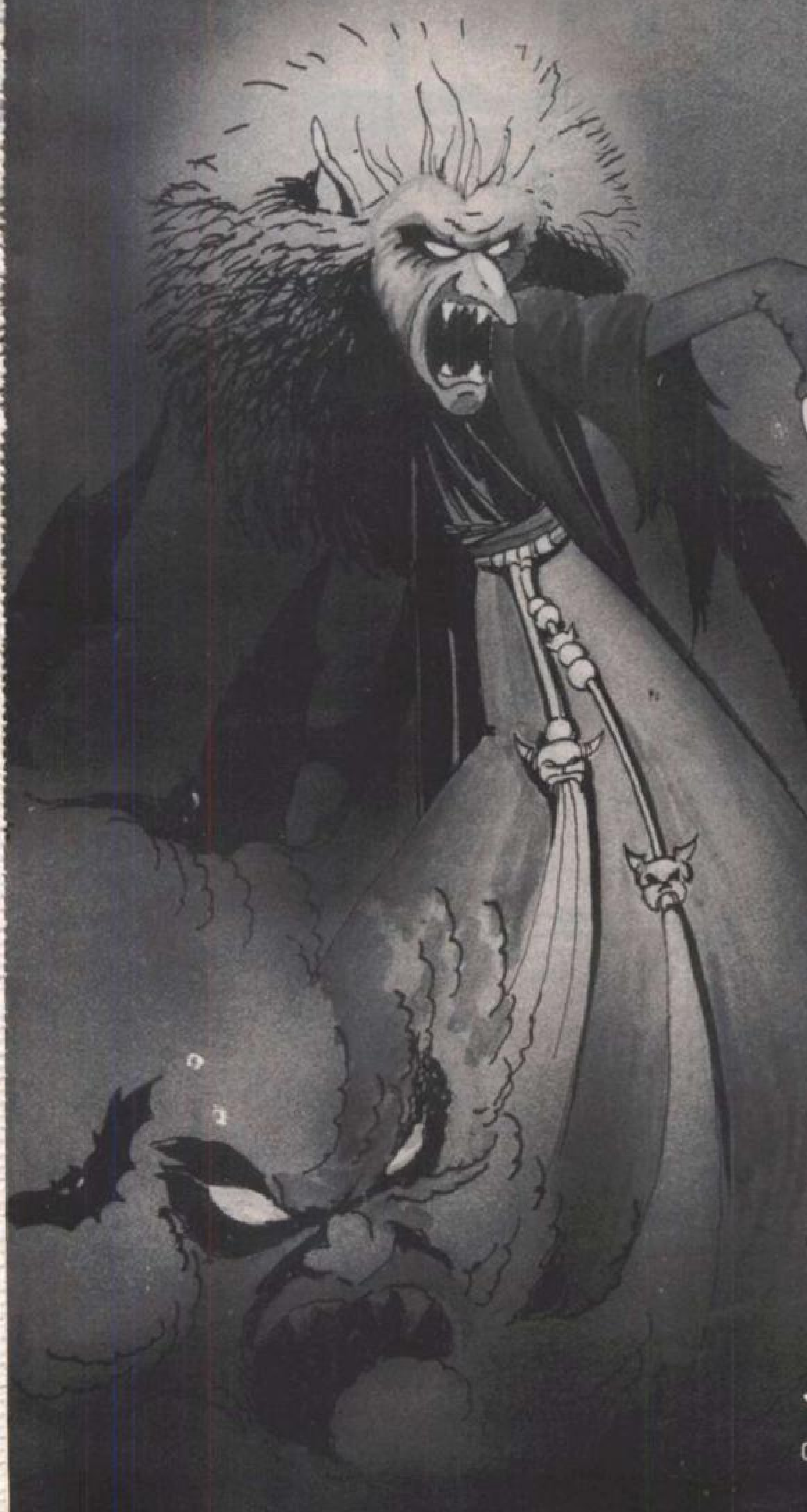
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NOTE: "The Wrath of Magra" is a complete adventure. You need not buy "Volcanic Dungeon" or "Black Crystal" to play it.

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Galac

An amazing arcade game from Gavin Smyth of Londonderry. A must!!



At last! A program that overcomes the problem of the speed (or lack of it) of Sinclair BASIC. This machine code space invaders-type game occupies just over 1K and so will run on either the 16K or 48K Spectrum. This is not at attempt to teach machine code programming, but with the instructions given, anyone can run the program without having to understand it.

The object of the game is to destroy the eight coloured spiderlike aliens randomly moving about the screen dropping bombs all the time. Naturally you have to hit them dead centre, but if a bomb touches your gun at all, bang! If you are invaded, you only lose a life, not the whole game. To begin with, the game is easy since the gun moves at eight times the speed of an invader but after you have bumped off the first three without trying, the remaining aliens move at a fifth of the guns speed — to get the last one, you have either to be pretty quick or very lucky! After this, you get another sheet with an extra life, but games do not normally last for more than three screenfuls of aliens.

The aim of the program

There are several reasons for writing this program:

1 To make a game less predictable than the familiar legions marching across the screen in neat rows. This randomness adds to the difficulty, keeping games short and defeating those show-offs who hog the space invaders machine all evening.

2 To keep kids (and adults!) out of the way by making the games colourful, noisy, simple to operate and totally uncrashable (famous last words). The controls are: Z for left, X for right and space to fire. There is no return to BASIC in the program (to prevent cries of "Hey! They've stopped moving!"), so the only way to dispel the menace forever is to pull the plug-out — but beware, the game is addictive.

3 To cause endless frustration with the aliens' continuous chirping and high scores not even in three figures. (My best so far is a mere quarter century and the score counter can clock up to 9999.)

4 Finally, to show how the Spectrum ROM can be used to simplify progamming by performing the more fundamental duties such as printing.

Interesting routines

Here are a few of the techniques used in the program to get a lot out of the machine without typing too much in:

RANDOM NUMBERS: The subroutine RND (address 32056d) returns a fairly random number in the A register. What it does is step a pointer through the ROM and return the value of that location (random enough for this purpose although there is a distinctly non-random region) an unused region of over 1K starting at 14446d, where all the memory locations contain 255d. This provides an interesting short period every three sheets or so when the aliens move uniformly without dropping bombs and with a distinct sound, but they are still just as frustratingly tricky to hit.

SOUND: The subroutine BLEEP (31677d) is used to emit a random short tone. It is there simply to slow the program a little, it can be slowed still more by increasing the value of DE in this routine (equivalent to POKEing a larger number of locations 31683d). This routine calls the ROM subroutine BEEPER (949d) which controls the loudspeaker. This is one of the few routines that corrupts the IX register pair, hence the PUSH IX and POP IX near it in the program in places.

To use BEEPER, DE should contain a number equal to INT(frequency*duration) and HL should contain INT(437500d/frequency-30.125d).
For example, to play the note A 440Hz for 2.5 seconds:

DE contains INT(440*2.5)= 1100d
HL contains INT(437500/440-30.125)=962d

INVADER CONTROL: The IX register pair is used to hold the start of the individual invader databases, greatly simplifying code since, for example, the invader column is always (IX+1) regardless of the invader being used.

Graphics galore

The remainder of the routines deal with graphics:

CLS (3435d): This routine simply clears the screen.

BORD1 (8859d): This sets the border to the colour contained in the A register. For example, to set a red (code 2) border:

```
LD A,2
CALL BORD1
```

CHANOPEN (5633d): Before writing to the screen, it must be opened for printing. The upper screen is channel "S" with code 2, so to prepare for printing:

```
LD A,2
CALL CHANOPEN
```

PRSTRING (8252d): This prints a string of characters of length BC which starts at the address contained in DE. For example, to print the word "Sinclair" which is held in the ROM at 5440d:

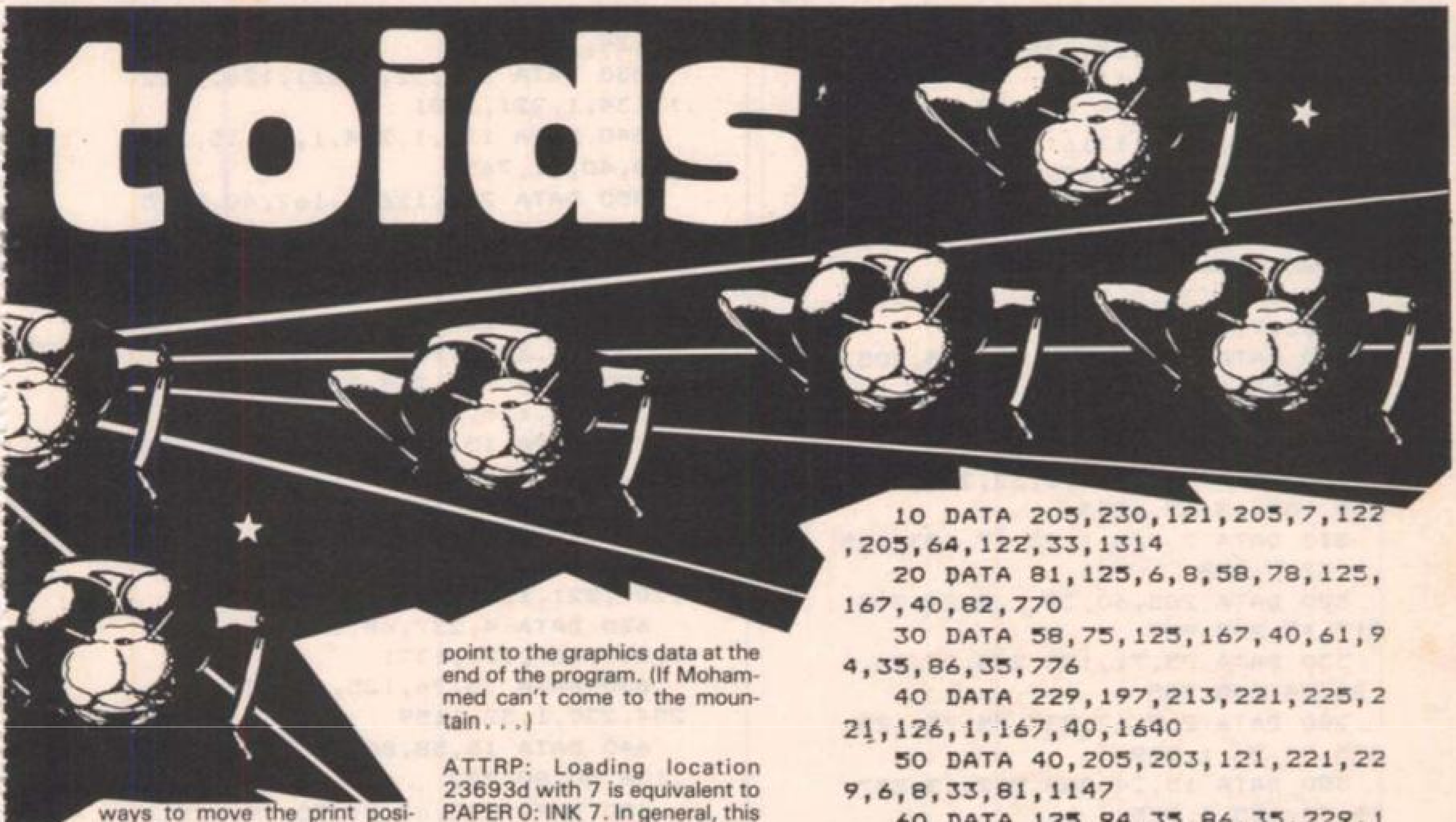
```
LD DE,5440d
LD BC,8; length of word
CALL PRSTRING
```

OUTNUM1 (6683d): This routine prints out the integer contained in BC, it is used to print line numbers. The number must be positive and less than 10000.

No check has been made for overflow of this type since it is unlikely that such a score will be reached.)

CLSET (3545d): There are two

toids



ways to move the print position. One is to use the AT code (22d) followed by position with PRSTRING or RST 10. This method is used in the PRINT routine, address 32034d. The other method is to use CLSET: for this, B contains 24d-row; C contains 33d-column. For example:

```
PRINT AT 5,6 ;is equivalent to:
LD B,19d      ;(24-5)
LD C,27d      ;(33-6)
CALL CLSET
```

You will notice that RST 10 occurs frequently in the program — this calls the main printing routine which displays the character with code held in A. It will cope with any character, including tokens, paper and ink controls, and position controls. For example, to print a blue "X":

```
LDA A,16d ;INK control code
RST 10
LD, A,1       ;colour code for blue
RST 10
L A,88d       ;code for "X"
RST 10
```

The subroutine MAININIT (31206d) takes care of setting up some system pointers:

UDG: Rather than move all the data for the graphics characters into the user defined area, the program changes the system variable UDG (23675d) to point to the graphics data at the end of the program. (If Mohammed can't come to the mountain. . .)

ATTRP: Loading location 23693d with 7 is equivalent to PAPER 0: INK 7. In general, this system variable contains:

FLASH*128d+BRIGHT*64 d + PAPER*8+INK

MASKP: Loading 23694d with 255d is equivalent to INK 8: PAPER 8: FLASH 8:

BRIGHT 8 — setting ink and paper to transparent so that screen colours will not be affected by anything printed — the alternative to this would be complex colour controls before each print.

There is also a general listing of the whole program (see listing 4).

Most of the information on ROM routines was found in Dr Ian Logan's book, *'Understanding your Spectrum'*, which contains a lot of valuable information on other routines and machine code for the Z80.

Typing it in

We received the listing of this program in full HEX, Mnemonics and REM form-unfortunately this ran to 16 pages! The present form was obtained by a program which created the lines in listing 1 by PEEKing at the code from the tape of the program supplied.

Each line of the listing consists of ten DATA bytes plus a checksum to help ensure that errors are eliminated. The method of entering these codes

```
  10 DATA 205,230,121,205,7,122
,205,64,122,33,1314
  20 DATA 81,125,6,8,58,78,125,
167,40,82,770
  30 DATA 58,75,125,167,40,61,9
4,35,86,35,776
  40 DATA 229,197,213,221,225,2
21,126,1,167,40,1640
  50 DATA 40,205,203,121,221,22
9,6,8,33,81,1147
  60 DATA 125,94,35,86,35,229,1
97,213,221,225,1460
  70 DATA 221,126,1,167,40,9,20
5,131,121,205,1226
  80 DATA 151,121,205,168,121,1
93,225,16,228,221,1649
  90 DATA 225,193,225,16,185,24
,178,33,78,125,1282
 100 DATA 52,17,64,0,33,0,32,20
5,181,3,587
 110 DATA 24,160,205,196,122,24
,152,221,126,0,1230
 120 DATA 254,21,192,205,27,124
,42,73,125,43,1106
 130 DATA 34,73,125,205,208,123
,201,221,126,0,1316
 140 DATA 33,79,125,190,192,221
,126,1,35,190,1192
 150 DATA 204,208,123,201,221,1
26,5,254,21,192,1555
 160 DATA 221,70,6,58,76,125,20
5,187,121,205,1274
 170 DATA 186,124,201,61,184,20
4,27,124,60,184,1355
 180 DATA 204,27,124,60,184,204
,27,124,201,205,1360
 190 DATA 1,123,205,249,124,221
,126,6,167,196,1418
 200 DATA 118,124,205,129,123,2
05,228,124,58,80,1394
 210 DATA 125,167,196,150,124,2
01,33,74,126,34,1230
 220 DATA 123,92,62,7,33,141,92
```

```
,119,62,255,986
  230 DATA 35,119,175,205,155,34
,58,120,92,111,1104
  240 DATA 237,95,230,31,103,34,
118,92,201,175,1316
  250 DATA 50,73,125,62,4,50,78,
125,205,107,879
  260 DATA 13,62,2,205,1,22,17,1
53,125,1,601
  270 DATA 32,0,205,60,32,1,5,24
,205,217,781
  280 DATA 13,237,75,71,125,205,
27,26,17,197,993
  290 DATA 125,1,133,0,205,60,32
,62,191,219,1028
  300 DATA 254,230,1,32,248,201,
205,107,13,62,1353
  310 DATA 2,205,1,22,17,153,125
,1,32,0,558
  320 DATA 205,60,32,1,5,24,205,
217,13,237,999
  330 DATA 75,71,125,205,27,26,1
,26,24,205,785
  340 DATA 217,13,237,75,73,125,
205,27,26,1,999
  350 DATA 15,24,205,217,13,237,
75,78,125,6,995
  360 DATA 0,205,27,26,33,0,88,6
2,7,6,454
  370 DATA 128,119,35,16,252,61,
254,2,32,245,1144
  380 DATA 62,8,50,75,125,33,81,
125,6,8,573
  390 DATA 94,35,86,35,213,221,2
25,175,221,119,1424
  400 DATA 6,221,112,0,221,52,0,
205,56,125,998
  410 DATA 230,2,61,221,119,4,20
5,56,125,230,1253
  420 DATA 15,198,8,221,119,1,16
,218,62,7,865
  430 DATA 50,76,125,175,50,80,1
25,201,17,185,1084
  440 DATA 125,1,12,0,205,60,32,
33,32,88,588
  450 DATA 17,33,88,6,82,229,213
,197,205,56,1126
  460 DATA 125,1,127,2,119,237,1
76,241,245,47,1320
  470 DATA 230,7,60,103,205,56,1
25,111,17,16,930
  480 DATA 0,205,181,3,193,209,2
25,16,222,33,1287
  490 DATA 0,48,17,80,0,205,181,
3,201,221,956
  500 DATA 126,0,221,119,2,221,1
26,1,221,119,1156
  510 DATA 3,205,56,125,230,15,3
2,15,205,56,942
  520 DATA 125,230,3,32,5,221,53
,0,24,3,696
  530 DATA 221,52,0,221,126,4,22
1,134,1,221,1201
  540 DATA 119,1,254,1,40,15,254
,30,40,11,765
  550 DATA 221,126,0,167,40,5,25
4,21,200,24,1058
  560 DATA 12,221,126,2,221,119,
0,221,126,3,1051
  570 DATA 221,119,1,221,126,1,2
54,2,204,120,1269
  580 DATA 123,254,29,204,120,12
3,205,56,125,230,1469
  590 DATA 15,204,120,123,221,12
6,6,167,192,205,1379
  600 DATA 56,125,230,1,192,221,
126,0,221,119,1291
  610 DATA 5,221,126,1,221,119,6
,201,221,126,1247
  620 DATA 4,237,68,221,119,4,20
1,205,189,123,1371
  630 DATA 33,76,125,62,127,219,
254,230,1,32,1159
  640 DATA 15,58,80,125,167,32,9
,126,50,80,742
  650 DATA 125,62,21,50,79,125,1
26,50,77,125,840
  660 DATA 62,254,219,254,203,87
,32,1,52,230,1394
  670 DATA 2,32,1,53,126,254,4,4
0,3,254,769
  680 DATA 27,192,58,77,125,119,
201,205,56,125,1185
  690 DATA 246,15,17,16,0,38,1,1
11,221,229,894
  700 DATA 205,181,3,221,225,201
,33,75,125,53,1322
  710 DATA 62,147,221,70,0,221,7
8,1,205,73,1078
  720 DATA 124,175,221,119,1,50,
80,125,42,73,1010
  730 DATA 125,35,34,73,125,58,7
2,125,188,40,875
  740 DATA 7,56,11,34,71,125,24,
6,58,71,463
  750 DATA 125,189,56,245,1,26,2
4,205,217,13,1101
  760 DATA 237,75,73,125,205,27,
26,1,5,24,798
  770 DATA 205,217,13,237,75,71,
125,205,27,26,1201
  780 DATA 201,58,76,125,6,21,79
,62,144,205,977
  790 DATA 73,124,1,15,24,205,21
7,13,33,78,783
  800 DATA 125,53,6,0,78,205,27,
26,62,22,604
  810 DATA 215,58,79,125,215,58,
```

```
80,125,215,62,1232
 820 DATA 32,215,175,50,80,125,
201,221,229,245,1573
 830 DATA 197,6,21,120,50,77,12
5,193,197,62,1048
 840 DATA 150,205,205,124,193,2
41,245,197,205,205,1970
 850 DATA 124,58,77,125,71,16,2
32,193,205,14,1115
 860 DATA 125,241,221,225,175,2
05,155,34,205,186,1772
 870 DATA 124,201,62,22,215,221
,126,5,215,221,1412
 880 DATA 126,6,215,62,32,215,2
21,52,5,62,996
 890 DATA 22,215,221,126,5,215,
221,126,6,215,1372
 900 DATA 62,154,215,201,33,79,
125,62,22,215,1168
 910 DATA 126,215,58,80,125,215
,62,32,215,53,1181
 920 DATA 40,13,62,22,215,126,2
15,58,80,125,956
 930 DATA 215,62,153,215,201,17
5,50,80,125,201,1477
 940 DATA 62,22,215,221,126,5,2
15,221,126,6,1219
 950 DATA 215,62,32,215,175,221
,119,6,201,205,1451
 960 DATA 34,125,38,2,22,0,205,
56,125,230,837
 970 DATA 31,95,205,181,3,205,5
6,125,205,155,1261
 980 DATA 34,201,58,77,125,6,21
,79,205,14,820
 990 DATA 125,58,76,125,6,21,79
,62,144,205,901
 1000 DATA 34,125,201,221,70,2,2
21,78,3,205,1160
 1010 DATA 14,125,221,70,0,221,7
8,1,62,147,939
 1020 DATA 205,34,125,201,62,22,
215,120,215,121,1320
 1030 DATA 215,62,8,215,6,4,62,3
2,245,215,1064
 1040 DATA 241,16,251,201,245,62
,22,215,120,215,1588
 1050 DATA 121,215,62,8,215,241,
245,215,241,60,1623
 1060 DATA 245,215,241,60,215,20
1,229,42,118,92,1658
 1070 DATA 35,62,63,164,103,34,1
18,92,126,225,1022
 1080 DATA 201,0,0,0,0,8,0,0,3,0
,212
 1090 DATA 0,97,125,104,125,111,
125,118,125,125,1055
 1100 DATA 125,132,125,139,125,1
46,125,0,0,0,917
 1110 DATA 0,0,0,0,0,0,0,0,0,0,0
 1120 DATA 0,0,0,0,0,0,0,0,0,0,0
 1130 DATA 0,0,0,0,0,0,0,0,0,0,0
 1140 DATA 0,0,0,0,0,0,0,0,0,0,0
 1150 DATA 0,0,0,0,0,0,0,0,0,0,0
 1160 DATA 0,0,0,22,0,0,32,83,67
,79,283
 1170 DATA 82,69,32,48,32,32,32,
32,76,105,540
 1180 DATA 118,101,115,32,52,32,
72,73,83,67,745
 1190 DATA 79,82,69,32,48,22,11,
11,71,65,490
 1200 DATA 77,69,32,79,86,69,82,
22,4,11,531
 1210 DATA 73,78,86,65,68,69,82,
83,13,13,630
 1220 DATA 13,32,32,32,32,32,60,
90,62,32,417
 1230 DATA 109,111,118,101,115,3
2,108,101,102,116,1013
 1240 DATA 13,32,32,32,32,32,60,
88,62,32,415
 1250 DATA 109,111,118,101,115,3
2,114,105,103,104,1012
 1260 DATA 116,13,32,32,32,32,60
,83,80,67,547
 1270 DATA 62,32,102,105,114,101
,115,13,13,32,689
 1280 DATA 32,80,114,101,115,115
,32,60,69,78,796
 1290 DATA 84,69,82,62,32,116,11
1,32,98,101,787
 1300 DATA 103,105,110,13,13,13,
13,13,147,148,678
 1310 DATA 149,32,32,153,32,154,
32,153,32,32,801
 1320 DATA 150,151,152,32,32,150
,151,152,32,32,1034
 1330 DATA 153,32,154,32,153,32,
32,147,148,149,1032
 1340 DATA 0,0,1,0,4,31,51,254,6
0,255,656
 1350 DATA 90,36,126,255,189,24,
0,0,128,0,848
 1360 DATA 32,248,204,127,8,20,3
4,65,1,102,841
 1370 DATA 24,0,0,126,219,153,25
5,195,126,60,1158
 1380 DATA 24,36,67,128,130,76,4
8,0,224,30,763
 1390 DATA 0,31,224,7,56,192,129
,66,36,129,870
 1400 DATA 129,36,66,129,3,28,22
4,7,248,0,870
 1410 DATA 120,7,0,24,60,60,60,2
4,60,0,415
 1420 DATA 102,60,24,24,60,126,6
0,0,0,0,456
```

are slightly different for the 16 and 48K Spectrums:

48K Enter both listings 1 and 2a and RUN the program, correcting any errors that are reported.

16K Do not enter listing 1 but enter listing 2b and RUN the program, enter each of the 11 numbers in each DATA line one number at a time. If you make a mistake the program will tell you and you will need to re-enter that line.

Saving

Before testing the program it MUST be saved on tape. Even though we have taken great pains to foolproof the entering system, it is still possible for an error to slip through!

First, remove the BASIC listing (if you entered it in the 48K mode make a copy on tape just in case by using NEW — the machine code is quite safe — then enter listing 3. To save both the loader and m/c enter GOTO 40, start the tape and press and key. After a few seconds the "start tape" message appears again, press another key and the m/c will be saved. Verify both sections by VERIFY"" and then VERIFY""Code.

To start the game either reload it from tape or enter RANDOMISE USR 31000. If all is well the instructions will be displayed and look out!

If it crashes then switch off, enter listing 4, RUN, reload the program and check each number until you find the mistake (not forgetting to ignore the last number of each DATA line), POKE the address given with the correct number. Now follow the saving procedure again.

```
LISTING 2a
1999 REM ** 48K LOADER **
2000 CLEAR 30999: RESTORE
2010 FOR i=31000 TO 32417 STEP 1
0: LET c=0
2020 FOR j=0 TO 9: READ a: POKE
(i+j),a: LET c=c+a: NEXT j
2030 READ a: IF a <> c THEN CLS
 : PRINT  FLASH 1;"ERROR AT LINE
 ";i-30990: FLASH 0: STOP
2040 NEXT i
```

```
LISTING 2b
1999 REM ** 16K LOADER **
2000 CLEAR 30999: RESTORE
2010 FOR i=31000 TO 32417 STEP 1
0
2020 LET c=0: FOR j=0 TO 9: INPU
T a: POKE (i+j),a: LET c=c+a: NE
XT j
2030 INPUT a: IF a <> c THEN  CL
S : PRINT  FLASH 1;"ERROR AT LIN
E ";i-30990: FLASH 0: GO TO 2020
2040 NEXT i
```

```
LISTING 3
   9 REM ** INITIAL PROGRAM **
  10 CLEAR 30999
  20 LOAD "" CODE
  30 RANDOMIZE  USR 31000
  40 SAVE "galacts" LINE 10
  50 SAVE "mc" CODE 31000,1418
```

```
LISTING 4
   1 REM ** CHECKING PROGRAM **
   5 CLEAR 30999: LOAD "" CODE
  10 FOR i=31000 TO 32417
  20 PRINT "Address-";i;"="; PEE
K i
  30 NEXT i
```

START	Call MAININIT	:Set system variables, 'random' number pointer.
NEWG	Call NEWGAME	:Reset score(0), lives(4); print instructions; wait until ENTER is pressed.
SCREEN	Call SETUP	:Print score, hiscore, lives; set screen attributes (in bands of different inks).
MAINLOOP	For each invader — Test lives; if none, GOTO ENDGAME. If invader pointed to is dead, try next; GOTO MOVE8.	
Call UPDATE	:Call MOVINVDR	:1 in 16 chance of row change (¼ up, ¾ move down). Check limits; if on edge or top, restore old position. If on bottom, return from MOVINVDR. If on edge, reverse direction. Random 1 in 16 chance of reverse. If bomb not dropped, ½ chance of drop; copy invader position into bomb.
	Call INVDRPRNT	Erase old invader, print new one.
	If bomb dropped, Call MOVBOMB	:Erase old bomb; move down a row; print new bomb.
	Call KEYBOARD	:Call BLEEP. If SPC pressed and bullet not fired, copy gun position into bullet. If Z pressed, move left. If X pressed, move right. If new position out of range, restore old co-ordinates.
	Call GUNPRINT	Erase old gun, print new one.
	If bullet fired, Call MOVBULLET	:Erase old bullet; move up a row; If at top row, reset bullet else print new bullet.
For each invader		
CHECK	If alive, Call LASTROW	:If invader on bottom line, blow up gun and invader.
Call HITINVDR	:If bullet and invader co-incident, Call BLOWINVDR	:Explosion (flashing, beeping). Reset bullet; signal dead invader; decrease number :invaders; increase score; update hiscore if necessary; print score and hiscore.
Call HITGUN	:If bomb has hit gun, Call BLOWGUN	:Explosion; reset bullet; decrease lives; print lives.
	If bomb is on bottom line, Call ERASEBOMB	:Erase bomb; reset its co-ordinates.

Loop back to CHECK for next invader.
Loop back to MOVE8 until all 8 invaders updated.
Go back to MAINLOOP to repeat sequence.

ENDSCREEN Award extra life; beep low tone; start another screen by jumping to SCREEN.

ENDGAME :Call DISPLAY print end message; flash screen and beep; beep very low tone.

Start another game by jumping to NEWG.









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Logo and

We welcome back Tim Hartnell who this issue gives us a fascinating article on Logo, a new language for the Spectrum and an introduction to turtle graphics.

Logo is quite different from BASIC. It was designed with the lofty aim of being a language which would 'teach learning' and, to a certain extent, this aim has been realised.

Pioneered by Dr Simon Papert when he was a Professor of Mathematics and Education at the Massachusetts Institute of Technology in the US (he has now moved to France where he is one of the leaders of the World Computer Centre), Logo is intended to be the very first programming language a person learns. The first language you learn inevitably colours the way you program and the way you think about programming for the rest of your life. Proponents of Logo claim that the base provided by initial exposure to Logo is a far more suitable one for future programming excellence than is a language such as BASIC.

Is there a basis for such a claim? Papert says that many teachers have only seen computers as devices which can extend the traditional ways of doing things in the classroom, rather than as utterly new teaching tools. In contrast to this, Papert says Logo is a liberating device, which enables computers to be used to teach new and important skills, including the skill of 'learning how to learn'.

Following observations made by Jean Piaget that children are able to learn quite complex skills — such as being able to talk and walk — without formal training, and the fact that this highly-effective informality was absent in traditional classroom teaching, Papert set out to create a language which would remedy this deficiency. Papert says most school instruction in computer programming puts the child almost in the position of being programmed by the computer. Logo, by contrast, puts the child firmly in charge.

It does this by allowing the programmer to create new shapes and actions — such as one which draws a triangle — and then get the computer to execute this on demand, simply by entering TRIANGLE. BASIC has no such way of creating new commands and functions.

Put just about anyone in France, let them live there for a while and they will become skilled French speakers, even if they had a prior concept of themselves as 'not good with languages'. The same holds true for mathematics, claims Papert. Part of Logos function is to allow users to 'live in Mathland' where there is no such thing as a person who is 'not good at Maths'. In an article, 'Logo in the Schools' (BYTE magazine, August 1982, pp 116-134), Daniel Watt reports that 'teachers found that students who had taken part in the Logo classes were more willing to "argue sensibly about mathematical issues" and to explain their "mathematical difficulties clearly".'

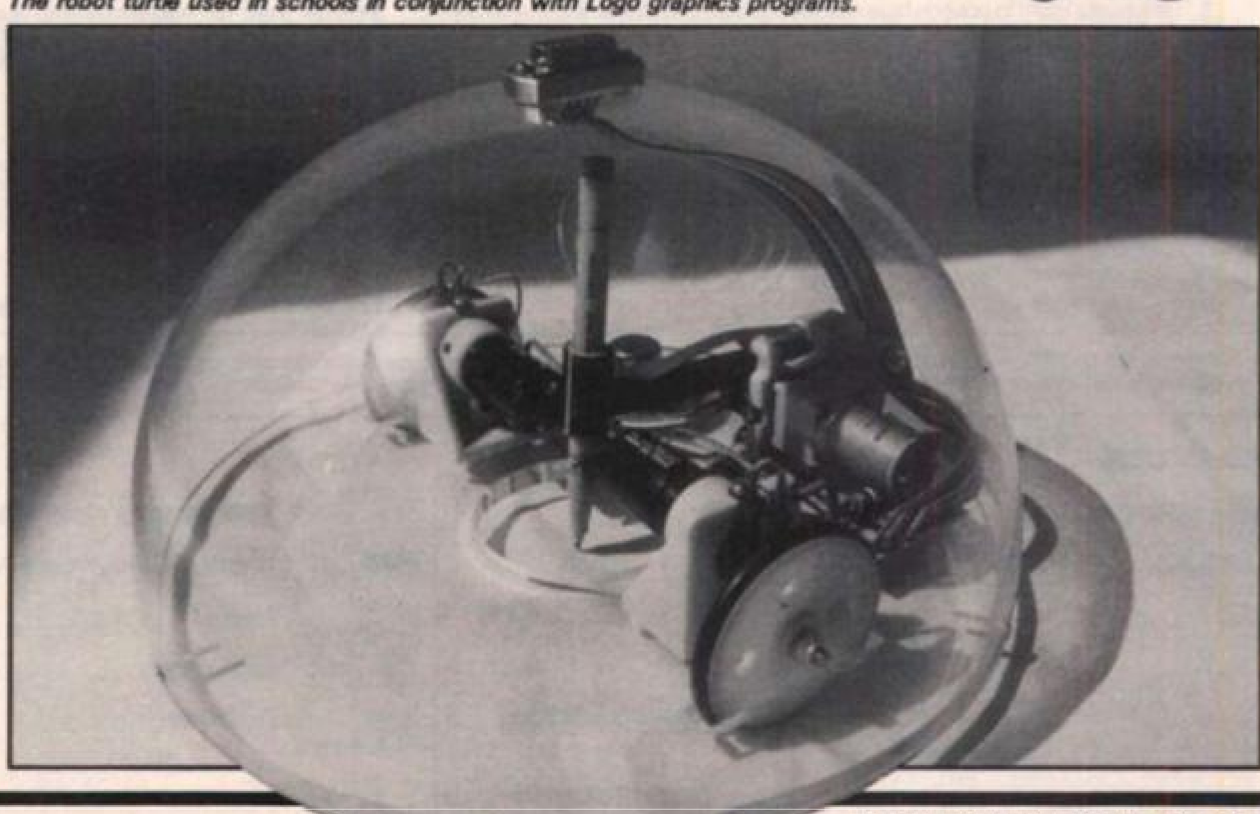
When computers were first developed, memory was at a premium. Programmers had to bend their thinking to the demands of the machine (such as integer variable name starting with specific letters), regardless of how much extra work this added. The thinking that human beings should continue to humble themselves before the computer's demands has continued.

Although BASIC is relatively easy for a computer to interpret as well as easy to teach, it is not a flexible language and labyrinthine program constructions are sometimes needed. Papert and his team at MIT decided when developing Logo that they would not allow their work to be limited by computer technology. Rather than gear their thinking to the cheap (for the time) computers available when they began their work in the late sixties, the team worked with the biggest mainframes they could.

The most familiar aspect of Logo is 'turtle graphics' when the computer controls the movement of a 'turtle' (a triangular shape on the screen) which leaves a trail behind it as it moves. Therefore, if the turtle moves up the screen for an inch, turns through 80 degrees and moves another inch, turns and moves, turns and moves again , it will have traced out a square.

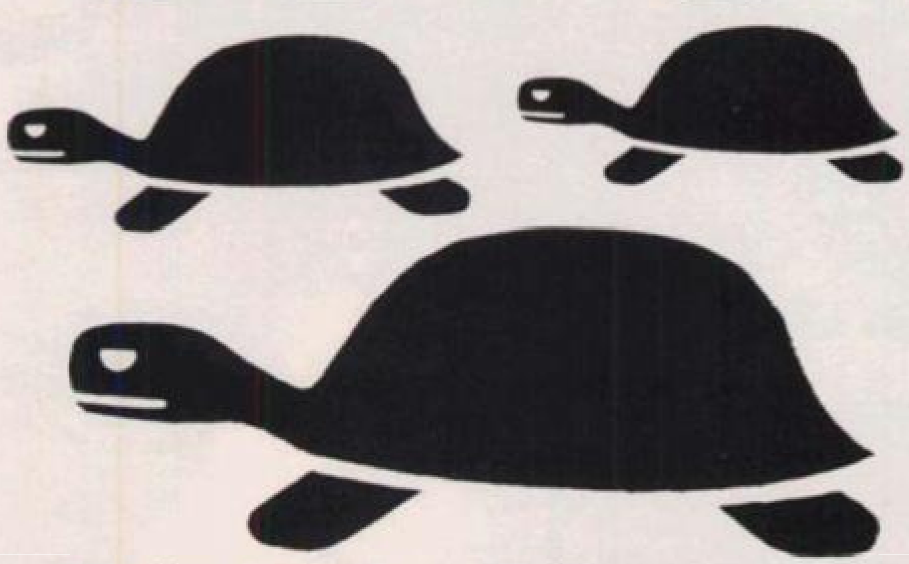


The robot turtle used in schools in conjunction with Logo graphics programs.



Photograph courtesy of Jessop Acoustics Ltd.

turtles



Turning turtle?

Turtles move in 'turtle steps' (with a screen being about 200 turtle steps high). A turtle command is often in the form of a direction (such as FORWARD) followed by a number of turtle steps — FORWARD 100 would cause the turtle to move half way up the screen (FORWARD is the direction the triangular cursor is facing).

With Logo, the computer can be taught a sequence of moves, such as the one we described to trace out a square, and the sequence can be 'remembered' by the computer under the name, say, SQUARE. Then, whenever we want the turtle to draw a square, we just enter SQUARE. A sequence of moves like this is called a *procedure*. The process of drawing a square could be even simpler. Think of FORWARD 100. The computer draws a line up the screen. The word RIGHT followed by a number turns the turtle to the right the number of degrees specified by the following number, so RIGHT 90 will make it turn through a right angle. Moving FORWARD 100 again will draw a line at right angles to the first. Follow this with RIGHT 90 and the turtle will turn through another 90 degrees (and will now be facing down the screen). Going through the sequence FORWARD 100 RIGHT 90 four times will draw a square.

This should give us a hint as to how the procedure SQUARE can be created more simply. The Logo word REPEAT means just that. A number follows REPEAT, and the computer repeats the instruction which follows the number however many times are specified. So, to create a square-drawing program, we need the following:

```
TO SQUARE
REPEAT 4 (FORWARD 100
RIGHT 90)
END
```

Note that the first line of this program, TO SQUARE, is the procedure title line. Run it, and the computer then knows what a square is, and can produce one whenever it encounters the command SQUARE. As I'm sure you can appreciate, there is no such facility in BASIC for creating new commands at will.

Logo has other useful commands, as such as CLEARSCREEN, and PENUP (which 'lifts the pen' from the screen) and PENDOWN. You can draw a line, lift the pen up and move it to another part of the screen, put the pen down and continue drawing.

Looking back to our definition of the procedure SQUARE above. You can see that if we had a way of entering the size (the 100 in our example) each time we ran the program, SQUARE could be used to draw squares of any size. Logo allows for this. If you include the variable name in the procedure title line, preceded by a colon, the computer will wait for you to enter the required information.

```
TO SQUARE: LENGTH
REPEAT 4 (FORWARD
:LENGTH RIGHT 90)
END
```

To run this, you enter SQUARE 64 (replacing 64 with the side length you choose).

From this, it is easy to see that we could do much more than just change the length of the side. We could easily define a procedure which allows you to specify not only the length of the side, but the number of repeats, and the angle through which the turtle will turn. If you're creating mental pictures of the effects of each of these changes, you'll see what a powerful tool we now have on our hands.

```
TO SHAPE :MANY :ANGLE
:LENGTH
REPEAT :MANY (FORWARD
:LENGTH RIGHT :ANGLE)
END
```

This simple procedure holds a wealth of extraordinary effects.

To draw a triangle, with sides 35 steps long, you'd just enter:

```
SHAPE 3 120 35
```

A star with each line 55 steps along could be drawn with:

```
SHAPE 5 144 55
```

We will end our brief introduction to turtle graphics by pointing out that once the computer has been taught a word such as SQUARE, this procedure can be used within further definitions. That is, if you wanted the computer to print a shape, then move just a little to the side, then draw the shape again, and repeat this a number of times, you could define the following procedure (assuming that the procedure SQUARE had previously been defined):

```
TO AMAZING :MANY
REPEAT :MANY (SQUARE 50
FORWARD 1)
END
```

There are four important features of Logo:

1 PROCEDURES The language works by defining sequences of steps called *procedures* which are then *called*. Procedures can incorporate other procedures. The closest BASIC equivalent (and it is generally NOT helpful to learn Logo by drawing attention to barely-equivalent BASIC statements) would be a series of subroutines which were called by name (such as GOSUB PAUSE, where PAUSE was a variable which had previosuly been assigned a value of the line number where the subroutine PAUSE began).

2 INTERACTION Any command, whether it's one which is part of the original language (such as FORWARD or PENUP) or one defined as a procedure, can be triggered just by entering the command, such as the word SHAPE or SQUARE.

3 LISTS The language supports compound structures called *lists* which are much easier to manipulate than are data structures such as arrays. They can be manipulated very flexibly. Procedures can be handled as lists.

4 TURTLE GEOMETRY The 'cybernetic animal', the turtle, will follow instructions to draw shapes on the screen. Turtle graphics have proved an ideal way of introducing the concept and practice of computer programming, and also as the basis upon which a computer-based mathematics curriculum can be built.

Further reading on Logo:

Mindstorms: Children, Computers an Powerful Ideas — Simon Papert (Basic Books, New York, 1980)

Logo for the Apple II — Harold Abelson (BYTE/McGraw Hill, Peterborough, 1982)

Learning Logo on the Apple II — Anne McDougall, Tony Adams, Pauline Adams (Prentice-Hall of Australia, 1982)

The August 1982 (Volume 7, number 8) issue of BYTE magazine is dedicated to Logo and is an extremely useful introduction to both the language, and to its implications.

(This article is reprinted, with permission, from an appendix in the book 'Educational Uses of the ZX Spectrum', Hartnell, Johnson and Valentine, published by Sinclair Browne, and distributed by John and Wiley and Sons.)

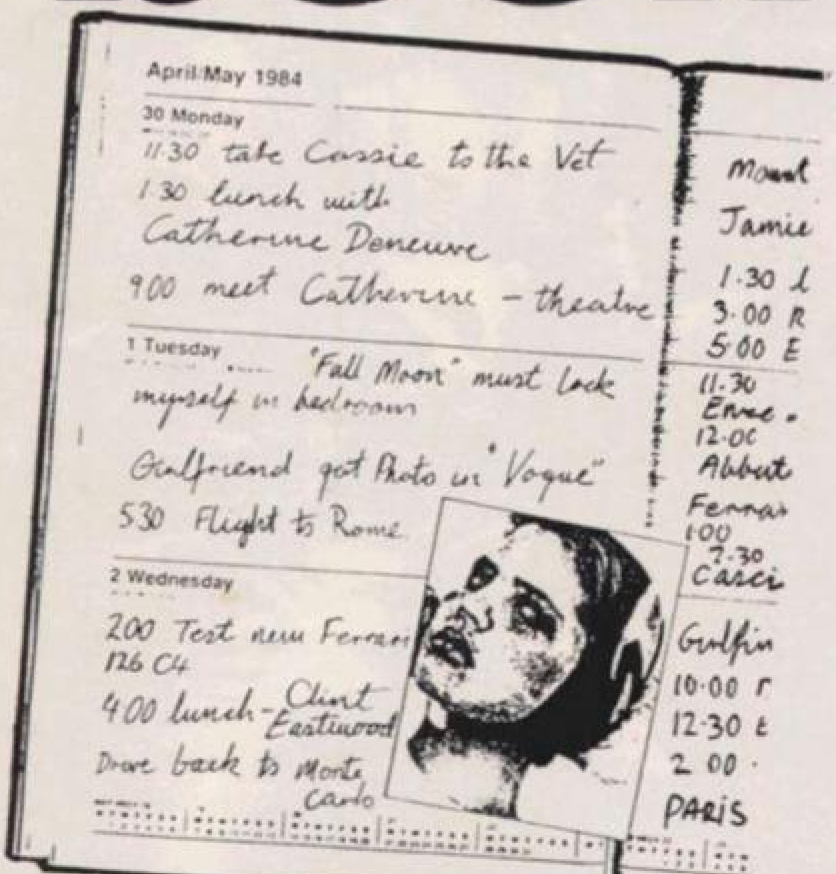

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Taken to book

Keep yourself up to date with this sample program from a new book, 100 Programs for the ZX Spectrum.



Prentice Hall International are publishing a new collection of programs for the Spectrum by authors, Ian McLean and John Gordon. The book is a large paperback which, as can be deduced, contains 100 program listings! A tape of these can also be purchased. The book is priced at £6.95 and the cassette at £11.50.

I have sent the book to Patrick Cain for a full review, but meanwhile, Prentice Hall have allowed us to publish a sample program from the book.

All the programs are given in this format, some have more detail given and longer explanations but all are set in the same typeface which is easier to read than the Sinclair printer reproduction often found nowadays.

The programs are split into ten sections with the following headings:

- Introduction
- Games
- Business
- In the Home
- Graphics
- Data Handling
- Recreation
- In the Science Lab
- Mathematics
- School

Our sample is taken from the 'In the Home' section. Diary could be used both to store diary information and as a simple word processor. Key in the program and RUN following the instructions.

```
  10 REM Program P35
    "DIARY"
  20 BORDER 1: PAPER 7: INK 1:
    CLS
  30 PRINT AT 9,12;"DIARY"
  40 PAUSE 100: CLS
  50 PRINT AT 3,3;
    "This program allows you to
     write a page of your diary
     and save the result onto
     tape.
     The option of displaying a
     previously recorded page is
     also given."
  60 PRINT AT 15,3; FLASH 1;
     INK 2;
    "PRESS ANY KEY TO CONTINUE"
    : PAUSE 0: CLS
  80 DIM d$(21,30)
 110 PRINT AT 4,4;
    "Do you wish to.......
     1. Review an old page

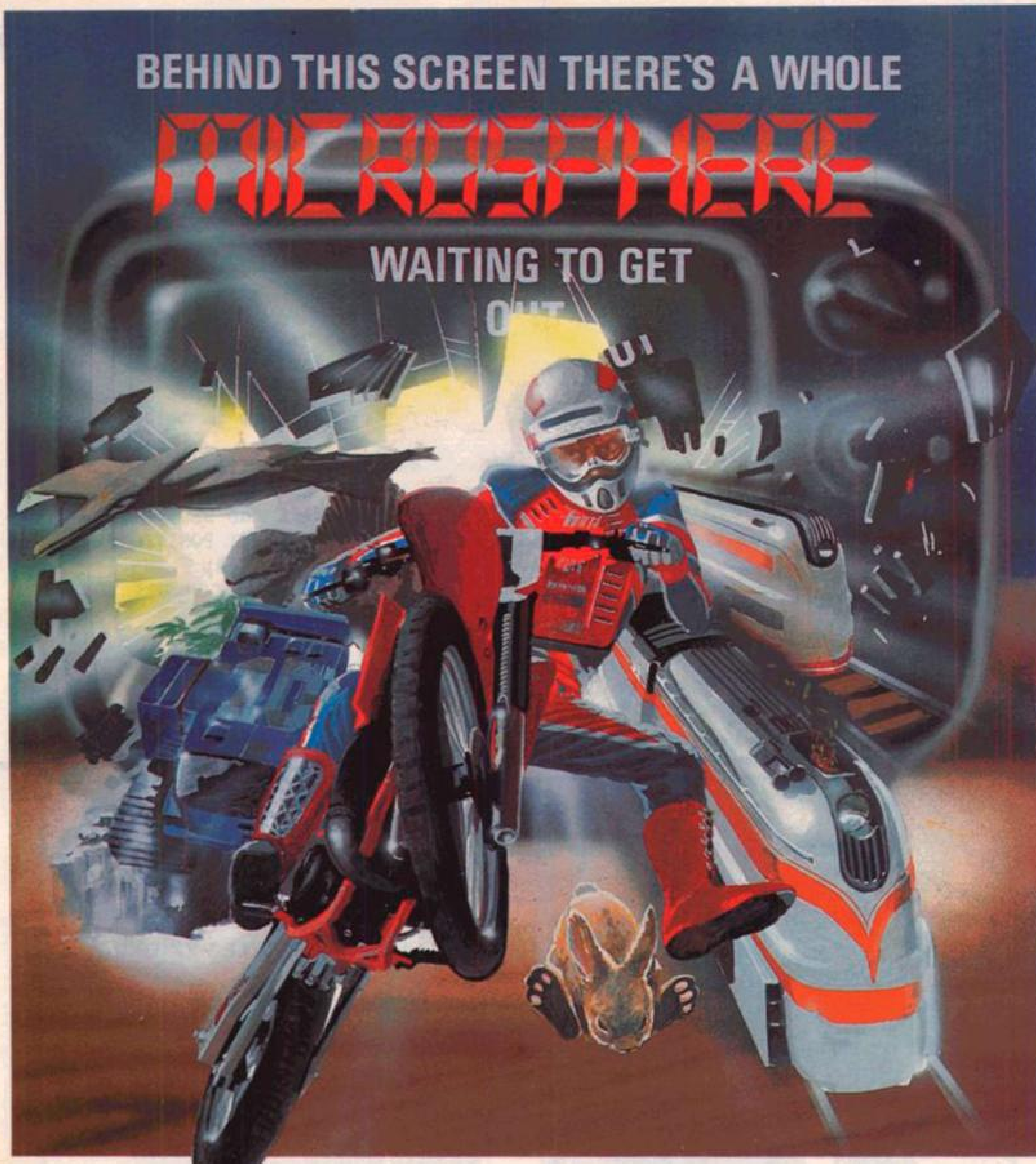
     2. Write a new page
     3. End the program"
 120 PRINT AT 14,5; INK 1;
    "ENTER CORRECT RESPONSE"
 130 INPUT "Option 1,2 or 3 ";
     opt
 140 IF (opt<>1) AND (opt<>2)
     AND (opt<>3) THEN CLS :
     PRINT AT 17,9;
    "WRONG RESPONSE

     Press any key."
 150 CLS
 160 IF opt=3 THEN STOP
 170 IF opt=1 THEN GO SUB 430
 180 IF opt=2 THEN GO SUB 220
 200 STOP : REM End of program


 220 PRINT AT 9,8; FLASH 1;
    "PRESS ANY KEY": PAUSE 0:
     CLS
 230 INPUT
    "What is today's date? ",t$
 240 CLS
 250 PRINT AT 8,4;
    "Type your diary page for
     ";t$
```

```
260 PRINT AT 18,5; FLASH 1;
   "PRESS ANY KEY TO START"
270 PAUSE 0: CLS
280 FOR i=1 TO 21
290 FOR j=1 TO 30
295 IF j<1 THEN LET j=1:
    BEEP 1,2
300 IF INKEY$<>"" THEN GO TO
    300
310 IF INKEY$="" THEN GO TO 310
311 IF CODE INKEY$=13 THEN LET
    j=30: GO TO 330
315 IF CODE (INKEY$)=12 THEN
    PRINT CHR$ 8;" ";CHR$ 8;:
    LET j=j-1: GO TO 295
320 LET d$(i,j)=INKEY$:
    PRINT d$(i,j);
325 IF j=28 THEN BEEP 1,2
330 NEXT j
335 PRINT
340 NEXT i
350 FOR i=1 TO 5: BEEP .2,i:
    NEXT i
360 INPUT
   "Has your recorder been set
    up correctly with a tape in
    it ?(y/n) ";resp
370 IF resp<>y OR resp<>Y
    THEN GO TO 360
380 SAVE t$ DATA d$()
390 PRINT AT 9,3;
   "REWIND TAPE FOR VERIFYING"
400 VERIFY t$ DATA d$()
410 RETURN
420 CLS
430 INPUT
   "What is the date of the
    page that you wish to
    review?
    (Enter date as before)
    ";p$
440 PRINT AT 6,3;
   "LOAD RECORDER WITH CORRECT
        TAPE AND REWIND TO
         CORRECT POSITION"
450 PRINT AT 16,4; FLASH 1;
   "PRESS ANY KEY WHEN READY"
460 PAUSE 0
470 LOAD p$ DATA d$()
480 CLS
490 PRINT d$
500 RETURN
```

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Spectrum lessons

Mike Edmunds takes his Spectrum into school and reports on some of the latest educational software available.

With an increasing amount of educational software now on the market, we felt that we ought to have a special review spot for these programs. Mike Edmunds has enough computing experience to be able to assess the standard of programming and, as a professional teacher, can give a qualified opinion on the educational value of the cassette. Of course, he can also test out the programs on the pupils at his school — the lucky lot!

Early Punctuation, The Apostrophe, Capital Letters and Speech Marks — Sinclair Research

Spelling and punctuation have never been the easiest of subjects for children, so any material that makes the task easier should be welcomed. A new range of software by Blackboard Software under the Sinclair banner aims to bring 'a light-hearted clarity. . to these tricky subjects.'

Designed for use both at home and in the classroom these cost £7.95 each. Not cheap if you intend to use the whole series, but all have something of value to offer. Each is a fairly well-structured package with a definite purpose which offers the user a 'one-to-one relationship' and experience that would be difficult to achieve without a computer.

These programs are not intended as teaching packages in themselves, rather as an accompaniment to a lesson. As such, each comes with a pamphlet briefly outlining the aims and giving full instructions as to how to 'tailor' the program for children of differing abilities. A list of useful books for further practice is also included.

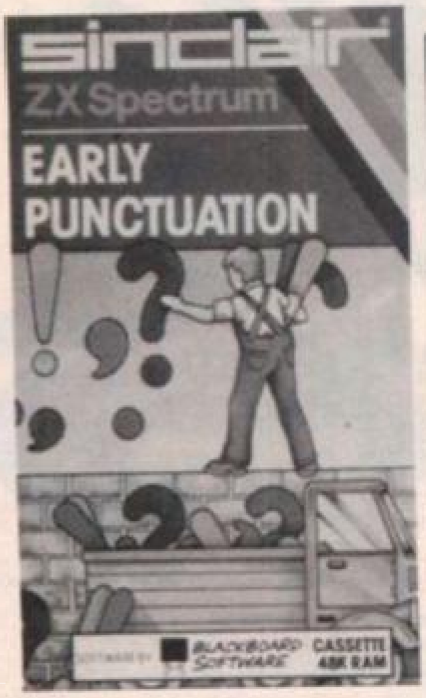
Although the theme of each program is different, the format is very similar. Instructions are followed by a 'step by step' example section and brief examples are given before the exercises proper. Successful completion of these gives entry to the next level or the reward game. These rewards are fairly basic in nature, being mainly keyboard trainers, but do aim to be instructive as well as entertaining and manage to succeed in both a colourful and amusing way. Graphics and sound are used to good effect in all of the programs.

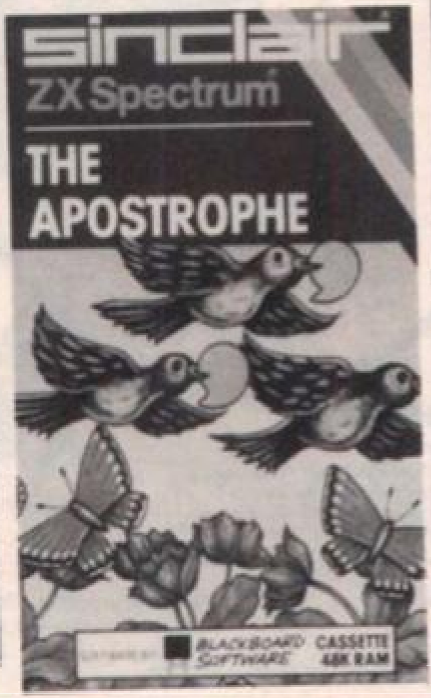
In Early Punctuation the child has to decide what punctuation is required and an animated figure drops in the appropriate mark when the correct key is pressed. Good hand/eye co-ordination is needed here as the figure is in constant motion: movement via cursor keys would have been better. Each correct answer brings a tune and builds up a further element of a picture used as part of the final 'shoot-em-down' reward game.

Capital Letters again uses the matchstick figure (this time controlled by cursor keys) to correct sentences with missing capitals. As with all the programs in this series, incorrect responses bring an invitation to try again — the computer eventually providing the answer after repeated errors.

In The Apostrophe a bird is guided to drop a worm (the apostrophe!) into the correct place. The worm gets its own back in the keyboard trainer reward game, when it can munch the flowers if your responses are too slow. This game is rather spoilt by 'chunky' target letters.

Speech Marks is of a rather









more complex nature and therefore offers three levels of difficulty. Sentences can contain one or two sets of speech marks; direct or reported speech or a mixture of each. This was the only program with a bug, a missing set of speech marks which remained uncorrected by the computer.

On the whole though, Blackboard have produced a nice package of programs to enliven the rather dull and mechanical process of puntuation. . . a pity some of the games lack imagination!

All programs are priced at £7.95 and available from Sinclair Research Ltd, Stanhope Road, Camberley, Surrey GU15 3PS.

Learn to Read (Programs 1-5) — Sinclair Research

A series of programs entitled Learn to Read is one of the latest educational offerings from Sinclair in collaboration with Macmillan Education. Together they have produced a comprehensive package for use by both parents and teachers to take children through the early stages of reading. The programs are based upon the popular Gay Way reading scheme, but can be used independently or alongside any reading scheme, using such techniques as word recognition, phonics (the matching of letters with sounds) picture matching, match and spell and so on.

All the tapes are attractively packaged in a sturdy box and come complete with a detailed booklet which outlines the way in which the parent can help, as well as detailing the role that the computer can play in their child's reading development.

The programs have been designed to make full use of the Spectrums graphic and sound capabilities and in this they succeed admirably. Loading is reliable and the initial screen displays give a taste of the fun to come! In Learn to Read 1 we are introduced to colourful representations of Sam the fox, the fat pig and their friends and these characters play leading roles throughout the series. Familiar tunes accompany each stage of the programs and serve to enhance the excellent graphics.

Although the programs can be used by the child alone, active participation by an adult is encouraged and indeed is necessary for the early tasks. On screen instuctions have been kept to a minimum, but initial 'reading aloud' by an adult is essential for the younger child.

All the programs in the series provide a substantial amount of activity and will keep any child entertained for a long time. Each section is very user-friendly and above all, fun to use, helping the child to realise that learning can actually be enjoyable!

Learn to Read 1, 2 and 3 use the same format, consisting of 'Names' — an introduction to the characters and new vocabulary; 'Kim' — exercises in logical thinking and memory; 'Spell' — phonic and spelling practice and 'Card' — a pelmanism game for the matching of pictures, phonics or spellings. Learn to Read 4 deals primarily with alphabetical sequencing under the titles 'next' and 'middle'. 'Find', the final title, is a consolidation program. The last program in the series deals with 'positional' terms; inside, on, at the bottom of and so on using 'snap' and spelling games.

A lot of thought has gone into these programs. They are well structured and help the child move in easy stages towards becoming a reader. The programs aim to be diagnostic in approach, in that they gently prompt when an error is made, then reinforce by giving the mistake and follow it with an invitation to try again. Emphasis is placed on correct spelling at all stages but the necessary capitals and punctuation are built into the programs. Sinclair and Macmillan seem to be on to a winner here as this is an excellent series of 'teaching' programs. They are rather expensive but, in this case, the price is justified by the quality. However, as with all things, the proof of the pudding. . .

Learn to Read programs are £9.95 each and available from Sinclair Research Ltd.




A New Dimension in Spectrum Hardware
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1. Super positive response fire button.
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The LIGHT PEN enables you to produce high resolution drawings on your own TV screen simply by plugging into the ear socket of your Spectrum. The controlling software supplied with the light pen has 16 pre-defined instructions. You can change colour (Border, Paper, Ink), draw circles, arcs, boxes, lines and insert text onto the screen at any chosen place, you can also draw freehand. There is a feature to retain the screens and animate. On the 48K Spectrum you can retain 5 screens. You can also use the machine code on its own in your own programs, for selecting out of a menu etc. The LIGHT PEN is supplied with a control interface, to adjust the sensitivity/pen alignment.
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Battlef

Fancy your chances as a tank commander? James Thurlby of Farnborough lets you try.

"Message from HQ to Tank Commander. Destroy enemy sites. Return to base . . . Warning . . . Fields contain mines, traps and craters . . . You have 5 Tanks . . . . Good Luck . . ."

If you manage to complete your mission then you get your just reward — another mission with even more obstacles to avoid, and a greater concentration of enemy sites!

To wipe out an enemy site all you have to do is to drive your tank over it: simple but effective! Once all the sites have been destroyed then you will be told to return to your base camp. At the end of the game you will be given a ranking according to your performance.

This is one of those simple but annoyingly addictive games which appear now and then. Controlling your tank is not as easy as it looks and accurate timing of key pressess is essential.

Your computer controlled tank responds to key "q" to go up, "z" down, "7" left and "8" right. However, it only recognises lower case letters so make sure that CAPS LOCK is off or, as an exercise, adjust the program to take this into account.

Variables

S$(21,31)	Character array holding screen display
tank	Number of tanks left
dest	Number of enemy sites destroyed
stage	Stage of the game
x,y	Random numbers used to calculate position of obstacles
ts	Tank UDG different for each of the four directions
a,b	Horizontal and vertical position of tank
a1,b1	Old tank position
res	Number of enemy destroyed in this stage
n$	Tank direction of movement
m $	Change of direction on key pressed
f	Loop variable
r$	Rank achieved by player
c,d	Duration and pitch values for BEEPs
z$	Input string for questions asked in the program

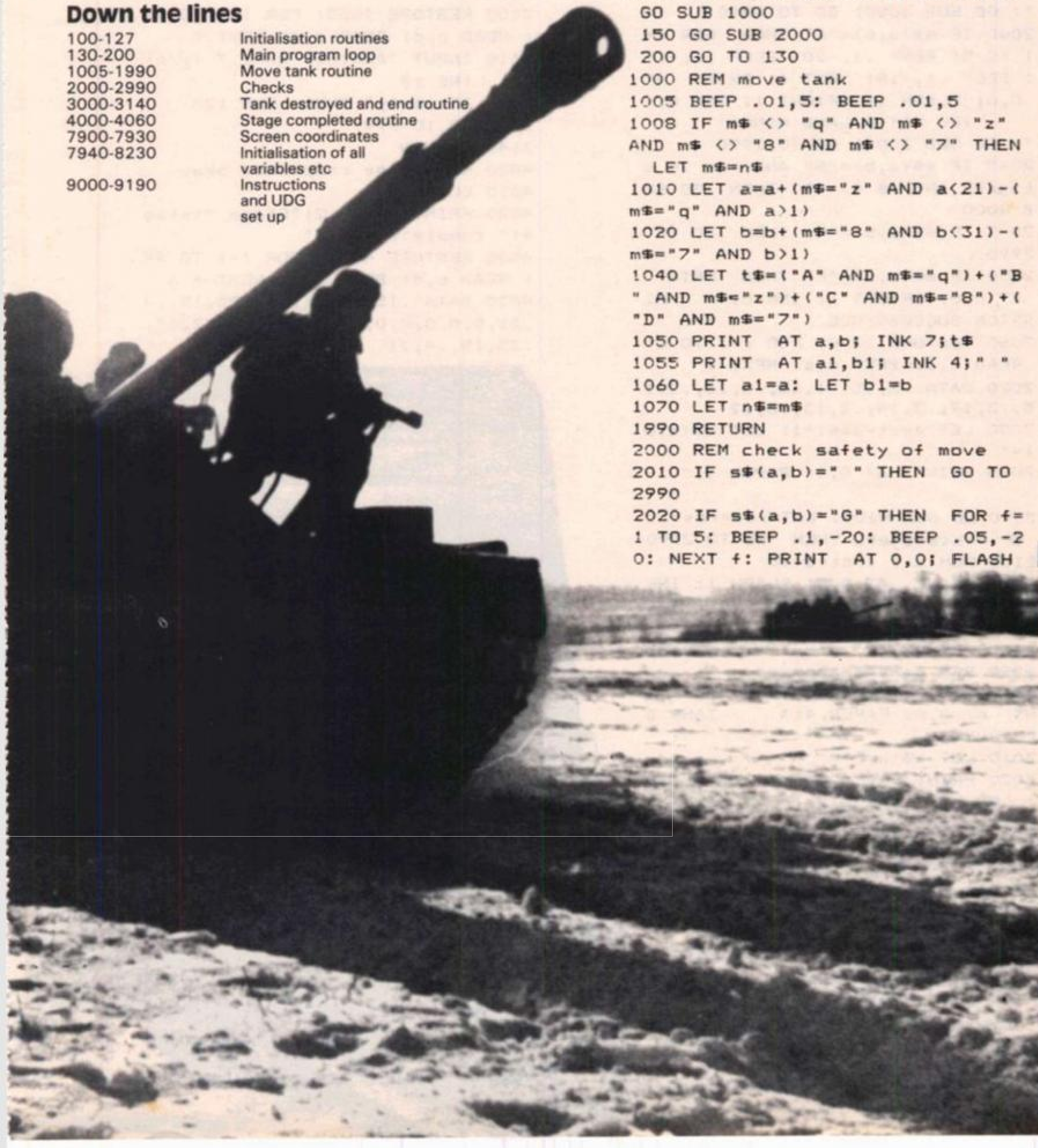


ield

Down the lines

100-127	Initialisation routines
130-200	Main program loop
1005-1990	Move tank routine
2000-2990	Checks
3000-3140	Tank destroyed and end routine
4000-4060	Stage completed routine
7900-7930	Screen coordinates
7940-8230	Initialisation of all variables etc
9000-9190	Instructions and UDG set up

```
 100 REM main program
 110 GO SUB 9000
 120 GO SUB 7940
 125 PRINT  AT a,b;t$: PAUSE 10
 127 LET n$="8"
 130 LET m$= INKEY$
 135 IF m$ <> "" THEN  GO SUB 10
00
 140 IF m$="" THEN  LET m$=n$: P
RINT  AT a,b; INK 7;t$: PAUSE 5:
 GO SUB 1000
 150 GO SUB 2000
 200 GO TO 130
1000 REM move tank
1005 BEEP .01,5: BEEP .01,5
1008 IF m$ <> "q" AND m$ <> "z"
AND m$ <> "8" AND m$ <> "7" THEN
  LET m$=n$
1010 LET a=a+(m$="z" AND a<21)-(
m$="q" AND a>1)
1020 LET b=b+(m$="8" AND b<31)-(
m$="7" AND b>1)
1040 LET t$=("A" AND m$="q")+("B
" AND m$="z")+("C" AND m$="8")+(
"D" AND m$="7")
1050 PRINT  AT a,b; INK 7;t$
1055 PRINT  AT a1,b1; INK 4;" "
1060 LET a1=a: LET b1=b
1070 LET n$=m$
1990 RETURN
2000 REM check safety of move
2010 IF s$(a,b)=" " THEN  GO TO
2990
2020 IF s$(a,b)="G" THEN  FOR f=
1 TO 5: BEEP .1,-20: BEEP .05,-2
0: NEXT f: PRINT  AT 0,0; FLASH
```



```
1; BRIGHT 1; INK 0;"   YOU RAN I
NTO A TANK-TRAP!!   ": GO SUB 30
00: GO TO 2990
2030 IF s$(a,b)="L" OR s$(a,b)="
H" OR s$(a,b)="I" OR s$(a,b)="J"
 OR s$(a,b)="K" THEN  FOR f=1 TO
 10: BEEP .01,-15: BEEP .05,-17:
 BEEP .01,-19: NEXT f: PRINT  AT
 0,0; FLASH 1; BRIGHT 1; INK 0;"
  YOU DROVE INTO A CRATER!!
": GO SUB 3000: GO TO 2990
2040 IF s$(a,b)="E" THEN  FOR f=
1 TO 5: BEEP .1,-20: BEEP .1,-19
: BEEP .1,-18: NEXT f: PRINT  AT
 0,0; FLASH 1; BRIGHT 1; INK 0;"
     YOU HIT A LAND MINE!!
": GO SUB 3000: GO TO 2990
2045 IF s$(a,b)="M" AND res >= s
tage*2 AND m$ <> "8" THEN  GO SU
B 4000
2047 IF s$(a,b)="M" THEN  GO TO
2990
2050 IF s$(a,b)="F" THEN  PRINT
 AT 0,0; BRIGHT 1; INK 0;"    MI
SSION SUCCESSFULL          "
2060 RESTORE 2070: FOR f=1 TO 8:
 READ c,d: BEEP c,d: NEXT f
2070 DATA .2,15,.1,15,.3,16,.3,1
5,.3,17,.3,14,.2,13,.5,12
2080 LET dest=dest+1: LET s$(a,b
)=" "
2085 PRINT  AT 0,0; PAPER 4;"
                               "

2090 GO SUB 8200: LET res=res+1:
 IF res<stage*2 THEN  GO TO 2990
2100 REM all destroyed
2110 PRINT  AT 0,0; FLASH 1; INK
 0; PAPER 7;"ALL destroyed - Ret
urn to base. "
2990 RETURN
2999 REM tank destroyed
3000 FOR f=1 TO 400: NEXT f: PRI
NT  AT 0,0; PAPER 4;"      TANK D
ESTROYED                "
3010 LET s$(a,b)=" "
3020 PRINT  AT a,b;" ": LET a=10
: LET b=1: LET a1=a: LET b1=b: P
RINT  AT a,b;"C": LET t$="C"
3030 LET n$="8": LET tank=tank-1
3040 FOR f=1 TO 300: NEXT f: PRI
NT  AT 0,0; PAPER 4;"
                         "

3050 GO SUB 8200
3060 IF tank>0 THEN  GO TO 3140
3070 REM end of game
3080 CLS : PRINT  AT 2,2;"End of
 game."; AT 5,3;"You rescued ";d
est;" m";("e" AND (dest>1 OR des
t=0))+("a" AND dest=1);"n."
3090 LET r$=("NOVICE" AND dest<1
0)+("CADET" AND dest >= 10 AND d
est<20)+("JUNIOR" AND dest >= 20
 AND dest<30)+("SENIOR" AND dest
 >= 30 AND dest<50)+("CAPTAIN" A
ND dest >= 50 AND dest<70)+("COM
MANDER" AND dest >= 70)
3100 PRINT  AT 10,0;"You have re
ached ";r$;'"     status in this
exercise."
3105 RESTORE 4035: FOR f=1 TO 44
: READ c,d: BEEP c,d: NEXT f
3110 INPUT "Another game ? (y/n)
 "; LINE z$
3120 IF z$="y" THEN  RUN 120
3130 GO TO 9999
3140 RETURN
4000 REM stage completed okay
4010 CLS
4020 PRINT  AT 5,2;"Stage ";stag
e;" completed....."
4030 RESTORE 4035: FOR f=1 TO 44
: READ c,d: BEEP c,d: NEXT f
4035 DATA .15,14,.1,17,.25,19,.4
,21,0,0,0,0,0,0,0,0,.1,14,.2,17,
.25,19,.4,21
```



```
4037 DATA 0,0,0,0,0,0,.1,14,.2,1
7,.25,19,.4,21,.25,17,.3,14,.2,1
7,.3,16,0,0,0,0,0,0,.2,17,.2,17,
.3,16,.5,14,.3,17,.2,21,.2,21,.4
,19
4038 DATA 0,0,0,0,0,0,.3,17,.4,1
9,.5,21,.5,17,.55,14,.5,16,.7,14
4040 GO SUB 8000
4050 LET n$="8"
4060 RETURN
7900 REM calculate screen co-ord
7910 LET x= INT ( RND *20)+1
7920 LET y= INT ( RND *30)+1
7930 RETURN
7940 REM initialise
7950 LET tank=5
7960 LET dest=0
7970 LET stage=0
8000 LET stage=stage+1
8010 DIM s$(21,31)
8020 BORDER 1: PAPER 4: CLS
8030 FOR f=1 TO stage*5
8040 GO SUB 7900: LET s$(x,y)="E
": PRINT  AT x,y; INK 1;"E"
8050 GO SUB 7900: LET s$(x,y)="G
": PRINT  AT x,y; INK 2;"G"
8060 GO SUB 7900: LET s$(x,y)="L
": PRINT  AT x,y; INK 0;"L"
8070 GO SUB 7900: LET s$(x,y TO
y+1)="HI": LET s$(x+1,y TO y+1)=
"JK": PRINT  AT x,y; INK 0;"HI";
 AT x+1,y; INK 0;"JK"
8100 NEXT f
8110 FOR f=1 TO stage*2: GO SUB
7900
8112 IF s$(x,y)="F" THEN  GO SUB
 7900: GO TO 8112
8115 IF x<12 AND x>8 AND y<4 THE
N  GO SUB 7900: GO TO 8115
8117 LET s$(x,y)="F": PRINT  AT
x,y; INK 6;"F": NEXT f
8120 LET t$="C"
8130 LET a=10: LET b=1: LET a1=a
: LET b1=b
8140 LET res=0
8160 PRINT  AT 10,0;"M"
8200 PRINT  AT 0,20;"           "
: FOR f=1 TO tank-1: PRINT  AT 0
,20+f*2; INK 0;"A": NEXT f
8210 FOR f=9 TO 11: PRINT  AT f,
1;"   ": LET s$(f,1 TO 3)="   ":
 NEXT f
8220 LET s$(10,1)="M"
8230 RETURN
9000 REM instructions
9010 PAPER 0: INK 7: BORDER 0: C
LS : PRINT  AT 0,7;"BATTLEFIELD.
"; OVER 1; AT 0,7;"____________"
; OVER 0
9020 PRINT  AT 2,2;"The game of
Battlefield makes you a tank com
mander  whose job  is to cross t
he  landscape and  destroy enemy
  installations."
9030 PRINT ' INK 5;"   The follo
wing keys control"''    the tank
:-"
9040 PRINT '"     ""q"" = move up
"''"      ""z"" = move down"''"
 ""8"" = move right"''"     ""7""
 = move left"
9100 REM set up UDG characters
9110 RESTORE 9120: FOR b=1 TO 13
: READ z$: FOR f=0 TO 7: READ a:
 POKE  USR z$+f,a: NEXT f: NEXT
b
9120 DATA "A",16,146,186,254,254
,254,186,130,"B",130,186,254,254
,254,186,146,16,"C",254,56,124,1
27,124,56,254,0,"D",127,28,62,25
4,62,28,127,0
9130 DATA "E",0,0,0,16,124,254,2
54,0,"F",112,76,66,76,112,64,64,
64,"G",0,16,56,124,124,254,254,2
54
9140 DATA "H",0,6,15,31,63,31,31
,15,"I",48,124,254,255,254,254,2
54,252,"J",63,63,63,31,31,7,3,0,
"K",255,255,254,254,252,248,176,
32,"L",16,124,255,255,255,126,28
,16,"M",14,62,126,14,2,2,2,2
9150 PRINT  INK 6'"   BEWARE of
landmines ""E"" ,        tank-tra
ps ""G"" and               crater
s ""L"" , ""HI"""';' TAB 19;"JK"
9160 INPUT "Ready to start ? ";
LINE z$
9170 INK 0
9180 RETURN
```



Guitar tutor

All you ever needed to know from Alan Renwick of Norfolk.

In *ZX Computing* Aug/Sept, we published a ZX81 program to help guitarists. We wondered about the possibilities of the Spectrum in this field, and were promptly contacted by Alan who had been working along these lines already. Written for the 48K Spectrum, this is a must for any guitarist, containing routines for expert and beginner alike, and is also a valuable educational aid.

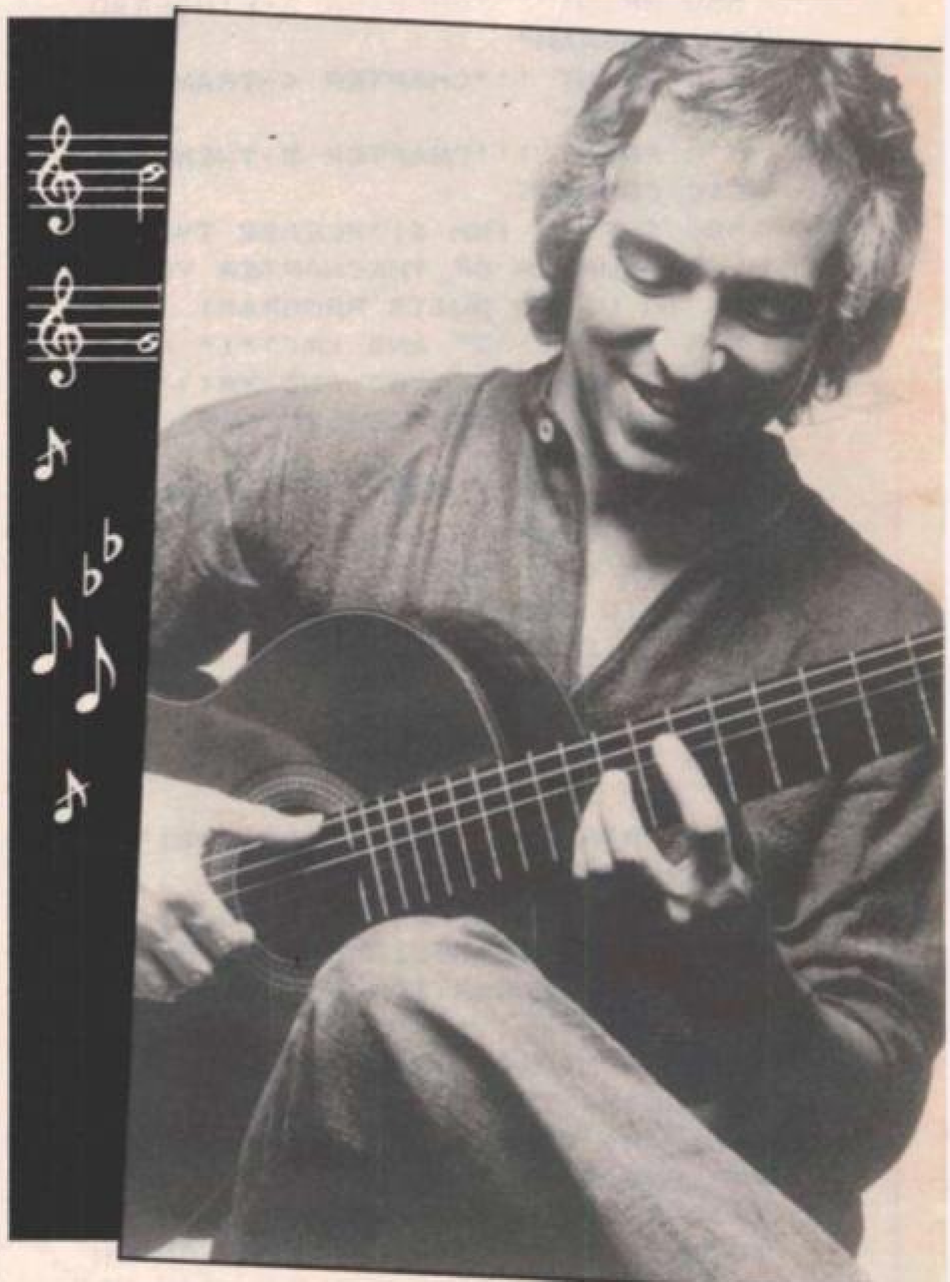
The program is designed to go one step beyond guitar tutor books by making use of the sound capabilities of the Spectrum to aid tuning and to check that you are playing chords correctly. There are limits to the ability of the Spectrum of course, one of which being the fact that only one note at a time can be played but Alan uses what is available to the full.

The program is structured in a simple manner which makes for easy expansion or contraction of the routines. Each particular subject is coded at a block of lines which is a multiple of 1000. This is selected from line 595.

If you renumbered lines 6000-6030 to 5960-5999 you would have room for three routines of your own at 6,7 and 8000. The possibilites are endless — how about lyrics, song structure and rhythm patterns?

The whole program is built around DATA statements and it is important that these are typed in accurately — especially lines 9210 to 9420. If the correct number of spaces are not left the program will crash. Note that the flat character is the UDG character A, but in the listing I replaced by "b" because my printer would print it as "A" and Ab is clearer than AA!

Twenty chords are included but more can be added if you wish by increasing the 20 in line 9210 DIM. and adding the extra chords to the DATA statements. These are constructed as follows:

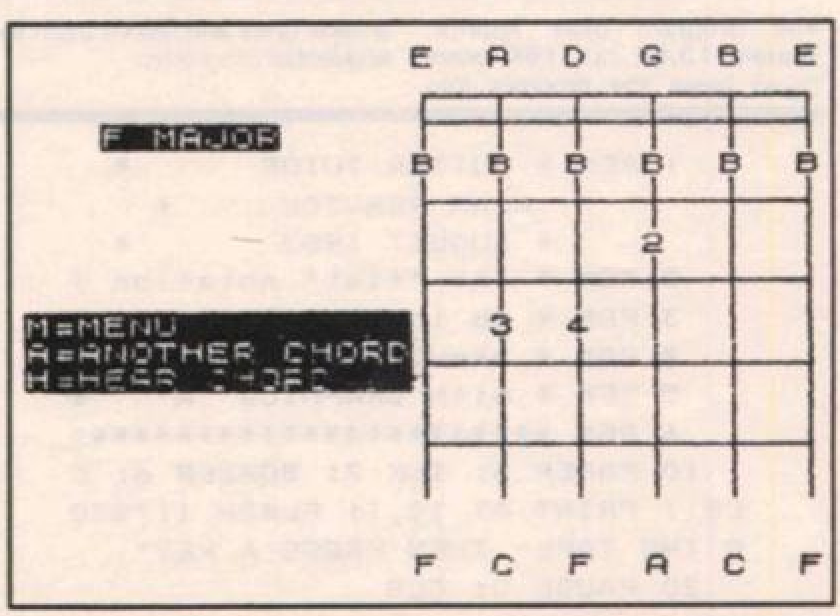


C$(x,1 to 12)	Notes which appear under the chord window.
13 to 16	Print position for finger 1.
17 to 32	Print position for other four fingers.
33 to 39	Chord name.
40 to 57	Values of notes for BEEP if user wants to hear chord.

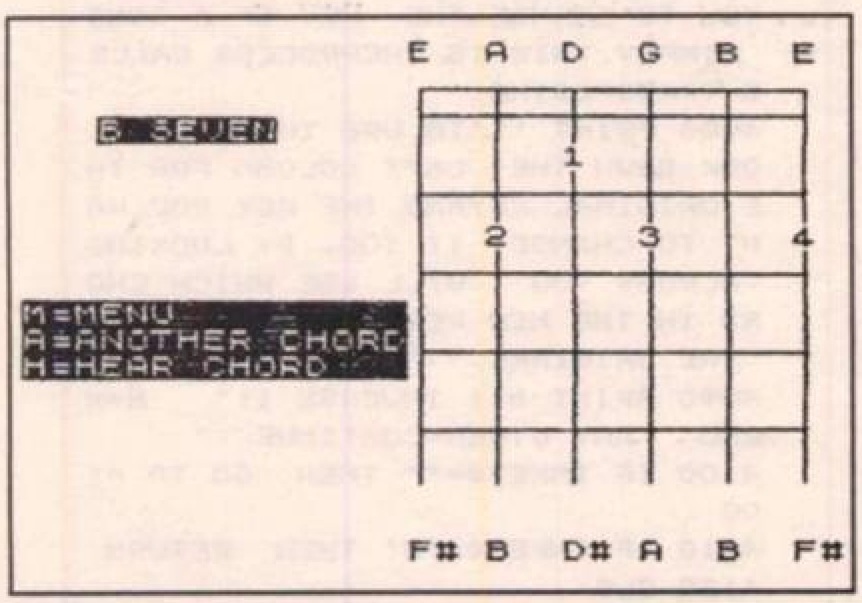
The program uses approximately 13.5K but 16K users could break the program into smaller units and record them as sequential programs.

```
   1 REM * GUITAR TUTOR        *
         ALAN RENWICK      *
        * AUGUST 1983         *
   2 REM * The "flat" notation *
   3 REM * (b in the listing)  *
   4 REM * should be replaced  *
   5 REM * with GRAPHICS "A"   *
   6 REM ***********************
  10 PAPER 6: INK 2: BORDER 6: C
LS : PRINT AT 10,1; FLASH 1;"STO
P THE TAPE- THEN PRESS A KEY"
  20 PAUSE 0: CLS
  30 BORDER 0: PAPER 0: INK 2: C
LS
  40 GO SUB 9980
  45 PRINT  INK 7;AT 11,11;"GUIT
AR TUTOR";AT 17,10; MICRO ORAC
LE"
  50 PAUSE 300: PRINT  INK 6; FL
ASH 1;AT 0,6;"PRESS ANY KEY TO S
TART"
  60 PAUSE 0: CLS
 200 GO SUB 9000
 210 POKE 23658,8
```

```
500 REM * MENU *
510 INK 7: PAPER 1: BORDER 1: INVERSE 1: CLS
520 PRINT AT 1,8;"GUITAR TUTOR."
525 PRINT OVER 1;AT 1,8;"_____________"
530 PRINT ''"CHAPTER 1-INTRODUCTION TO TUTOR"
540 PRINT ''"CHAPTER 2-TUNING THE GUITAR"
550 PRINT ''"CHAPTER 3-FINGERBOARD DIAGRAM"
560 PRINT ''"CHAPTER 4-TRANSPOSING SONGS"
570 PRINT ''"CHAPTER 5-TWENTY BASIC CHORDS"
580 INPUT INK 6;"PLEASE TYPE IN THE NUMBER OF THECHAPTER YOU WANT TO USE(Q QUITS PROGRAM) ";X$
583 IF X$<>"Q" AND X$<>"1" AND X$<>"2" AND X$<>"3" AND X$<>"4" AND X$<>"5" THEN GO TO 580
585 INVERSE 0
586 IF X$="Q" THEN CLS : GO SUB 9980: STOP
590 IF VAL X$<1 OR VAL X$>5 THEN GO TO 580
595 GO SUB VAL X$*1000
600 GO TO 510
1000 REM * INTRODUCTION *
1010 PAPER 6: BORDER 6: INK 1: CLS
1100 PRINT INVERSE 1;AT 0,8;"CHAPTER ONE."
1110 INVERSE 0: PRINT AT 3,4;"GUITAR TUTOR IS DESIGNED TO PROVIDE BASIC INFORMATION FOR   GUITAR PLAYERS."
1120 PRINT '"IT WILL HELP YOU WITH TUNING THEGUITAR, LEARNING CHORDS,AND EVENTRANSPOSING SONGS FROM ONE KEY  TO ANOTHER."
1130 PRINT '"YOU CAN USE GUITAR TUTOR LIKE A BOOK,DECIDING ON WHICH CHAPTER  YOU WANT TO USE, SO THERE'S NO  NEED TO GO  THROUGH THE WHOLE  PROGRAM IF YOU ONLY WANT ONE BITOF IT. EACH CHAPTER IS SELF-    EXPLANATORY."
1140 PRINT INVERSE 1; INK 2;" TO RETURN TO MENU AT ANY TIME       JUST PRESS M.          "
1150 PRINT INVERSE 0; FLASH 1;"      PRESS M  TO CONTINUE       "
1160 FLASH 0: IF INKEY$<>"M" THEN GO TO 1160
1170 IF INKEY$="M" THEN RETURN
2000 REM * TUNING THE GUITAR *
2010 BORDER 7: PAPER 7: INK 0: CLS
2100 PRINT AT 0,8; INVERSE 1;"CHAPTER 2."
2110 INVERSE 0: PRINT '"THERE ARE MANY TYPES OF TUNING  WHICH CAN BE USED ON THE GUITAR,BUT THE MOST COMMON IS THE ONE  SHOWN ON THE NEXT PAGE."
2120 PRINT '"ABOVE EACH STRING IS THE NAME OFTHE NOTE THAT THE STRING SOUNDS WHEN OPEN. THE DIAGRAM SHOWS HOWTHE GUITAR CAN BE TUNED IN A  RELATIVE WAY."
2130 PRINT '"THE NEXT PAGE SHOWS HOW TO TUNE THE GUITAR WITH THE HELP OF ANY KEYBOARD."
2135 PRINT '"THE LAST PAGE GIVES A METHOD OF TUNING USING THE SPECTRUM'S OWN LOUDSPEAKER"
2150 PRINT FLASH 1;"PRESS A KEY TO CONTINUE(M/MENU) "
2155 IF INKEY$="" THEN GO TO 2155
2160 IF INKEY$="M" THEN RETURN
2200 REM * PAGE 2 *
2205 BORDER 1: INK 7: PAPER 1: CLS
2210 GO SUB 9500
2215 PRINT AT 0,7;"RELATIVE TUNING"; OVER 1;AT 0,7;"_______________"
2220 PRINT INVERSE 1;AT 14,9;"A";AT 14,11;"D";AT 14,13;"G";AT 12,15;"B";AT 14,17;"E"
2225 PLOT 75,62: DRAW 16,83: PLOT 91,62: DRAW 16,83: PLOT 107,62: DRAW 16,83: PLOT 123,78: DRAW 16,68: PLOT 139,62: DRAW 16,83
2230 INK 7: PRINT AT 15,0;"TO TUNE THE GUITAR IN RELATION  TO ITSELF USE THE DIAGRAM ABOVE.E.G.T
```

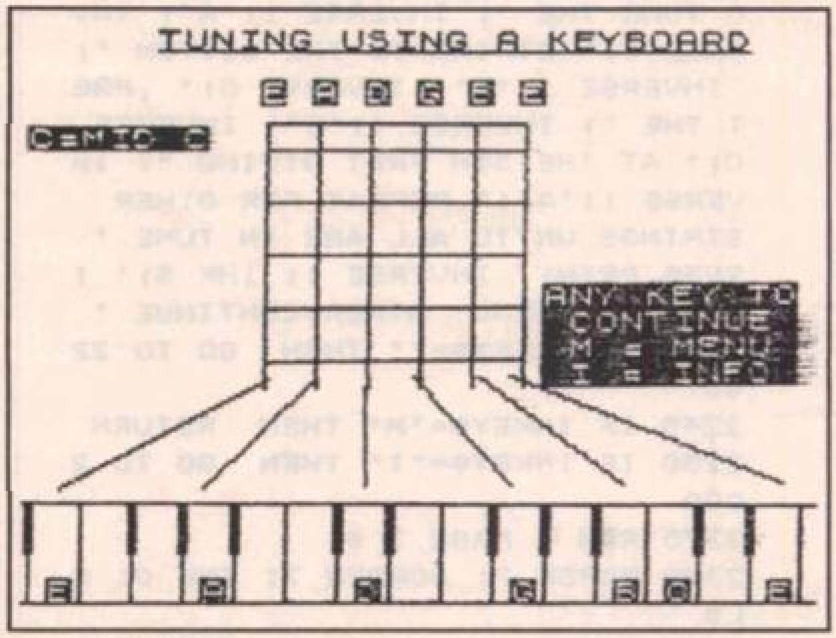


```
O TUNE THE "; INVERSE 1;"A"; INV
ERSE 0;" STRING TO THE BOTTOM ";
 INVERSE 1;"E"; INVERSE 0;" ,FRE
T THE "; INVERSE 1;"E"; INVERSE
0;" AT THE 5TH FRET GIVING "; IN
VERSE 1;"A";".REPEAT FOR OTHER
STRINGS UNTIL ALL ARE IN TUNE."
2235 PRINT  INVERSE 1; INK 5;" I
=INFO  M=MENU  OTHER=CONTINUE "
2240 IF INKEY$="" THEN  GO TO 22
40
2245 IF INKEY$="M" THEN  RETURN
2250 IF INKEY$="I" THEN  GO TO 2
000
2375 REM * PAGE 3 *
2380 PAPER 7: BORDER 7: INK 0: C
LS
2385 PRINT  INK 1;"      TUNING U
SING A KEYBOARD": PRINT  OVER 1;
AT 0,5;"_______________________"
2390 PRINT  INK 2; INVERSE 1;AT
4,0;"C=MID C"
2395 PRINT  INVERSE 1;AT 10,20;"
ANY KEY TO";AT 11,20;" CONTINUE
";AT 12,20;" M = MENU ";AT 13,20
;" I = INFO "
2400 GO SUB 9500
2410 FOR Y=2 TO 257 STEP 16
2420 PLOT Y,0: DRAW 0,30
2430 NEXT Y
2440 LET U=1: GO SUB 9800
2450 FOR U=33 TO 80 STEP 16: GO
SUB 9800
2460 NEXT U
2470 FOR U=97 TO 128 STEP 16: GO
 SUB 9800
2480 NEXT U
2490 FOR U=145 TO 182 STEP 16: G
O SUB 9800
2500 NEXT U
2510 FOR U=209 TO 238 STEP 16: G
O SUB 9800
2520 NEXT U
```

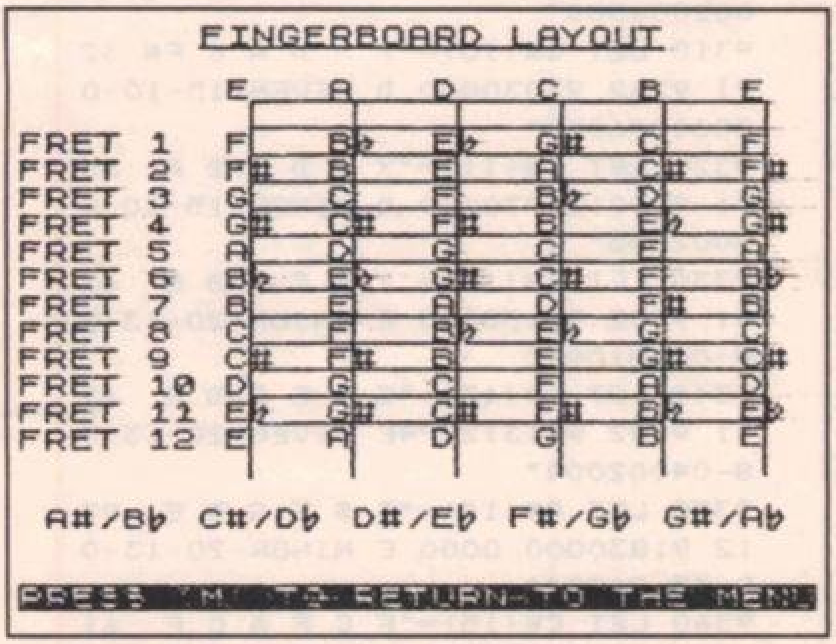



```
2530 PLOT 0,0: DRAW 255,0: PLOT
0,30: DRAW 255,0
2540 PRINT  INVERSE 1;AT 21,1;"E
";AT 21,7;"A";AT 21,13;"D";AT 21
,19;"G";AT 21,23;"B"; INK 2;AT 2
1,25;"C"; INK 0;AT 21,29;"E"
2545 INK 2
2550 PLOT 10,34: DRAW 65,33
2555 PLOT 55,34: DRAW 35,33
2560 PLOT 105,34: DRAW 0,30
2570 PLOT 150,34: DRAW -30,33
2575 PLOT 185,34: DRAW -45,33
2580 PLOT 235,34: DRAW -85,33
2585 INK 0
2590 IF INKEY$="" THEN  GO TO 25
90
2595 IF INKEY$="M" THEN  RETURN
2597 IF INKEY$="I" THEN  GO TO 2
000
2598 REM *  PAGE 4  *
2600 PAPER 7: BORDER 7: INK 0: C
LS
2610 PRINT ;TAB 5;"TUNING USING
THE SPECTRUM": PRINT  OVER 1;AT
0,5;"_________________________"
2620 PRINT AT 3,0;"USING THE SPE
CTRUM'S INTERNAL  SPEAKER IT IS
 POSSIBLE TO TUNE  A GUITAR. ALT
HOUGH NOT ENTIRELY ACCURATE A VE
RY GOOD RESULT IS  POSSIBLE."
2630 PRINT AT 9,0;"USING STANDAR
D PRACTICE THE    STRINGS ARE N
UMBERED FROM 1 TO 6AS SHOWN BELO
W. SIMPLY PRESS THEREQUIRED NUMB
ER ON THE KEYBOARD AND THE CORRE
CT NOTE WILL SOUND.BY REPEATING
THIS PROCEDURE YOU CAN TUNE THE
GUITAR."
2640 PRINT  INVERSE 1; INK 6; IN
K 2;AT 18,0;" PRESSING 7 PLAYS A
LL STRINGS. "
2650 PRINT  INK 2;AT 19,0;" 6
  5    4    3    2    1  ";AT
20,0;"  E    A    D    G    B
 E  "
2654 PRINT "        M = MENU I=INF
ORMATION   "
2655 INPUT Q$
2657 IF Q$="I" THEN  GO TO 2000
2658 IF Q$="M" THEN  RETURN
2660 IF Q$<>"1" AND Q$<>"2" AND
Q$<>"3" AND Q$<>"4" AND Q$<>"5"
AND Q$<>"6" AND Q$<>"7" THEN  BE
EP .3,20: GO TO 2655
2665 IF Q$="1" THEN  BEEP 1,4
2670 IF Q$="2" THEN  BEEP 1,-1
2675 IF Q$="3" THEN  BEEP 1,-5
2680 IF Q$="4" THEN  BEEP 1,-10
2685 IF Q$="5" THEN  BEEP 1,-15
```

```
2690 IF Q$="6" THEN  BEEP 1,-20
2695 IF Q$="7" THEN  BEEP 1,-20:
 PAUSE 50: BEEP 1,-15: PAUSE 50:
 BEEP 1,-10: PAUSE 50: BEEP 1,-5
: PAUSE 50: BEEP 1,-1: PAUSE 50:
 BEEP 1,4
2700 GO TO 2655
2999 PAUSE 0
3000 REM * FINGERBOARD *
3100 BORDER 0: PAPER 0: INK 7: C
LS
3110 PRINT AT 0,7;"FINGERBOARD L
AYOUT": PRINT  OVER 1;AT 0,7;"__
________________"
3120 PRINT AT 5,0;"ON THE FOLLOW
ING PAGE THERE IS ADIAGRAM WHICH
 SHOWS THE NOTES    THAT ARE PROD
UCED BY FRETTING    STRINGS AT TH
E FIRST 12 FRETS.   AFTER 12 FRET
S THE PATTERN REPEATS ITSELF."
3130 PRINT '' INVERSE 1;"PLEASE
NOTE"; INVERSE 0;" THE FOLLOWING
 NOTES HAVE TWO NAMES:"
3140 PRINT ''" A#/Bb C#/Db D#/Eb
 F#/Gb G#/Ab   "
3150 PRINT '' FLASH 1;" M = MENU
  ANY OTHER = CONTINUE  "
3155 IF INKEY$="" THEN  GO TO 31
55
3160 IF INKEY$="M" THEN  RETURN
3165 CLS
3167 REM * PAGE 2 *
3170 PRINT AT 0,7;"FINGERBOARD L
AYOUT": PRINT  OVER 1;AT 0,7;"__
________________"
3175 PRINT AT 2,8;"E   A   D   C
  B   E"
3176 RESTORE 3000
3180 FOR N=1 TO 12
3190 READ D$
3200 DATA "F    Bb  Eb  G#  C  F
","F#   B   E   A   C#  F#","G
C  F    Bb  D   G","G#  C#  F#
B  Eb  G#","A    D   G   C   E
 A","Bb  Eb  G#  C#  F   Bb","B
 E   A   D   F#  B","C   F   Bb
 Eb  G   C","C#  F#  B   E   G#
 C#","D   G   C   F   A   D","E
b  G#  C#  F#  Bb  Eb","E   A
D   G   B   E"
3210 PRINT AT N+3,8;D$
3220 NEXT N
3225 FOR N=2 TO 14: PRINT  OVER
1;AT N,9;"________________":
 NEXT N
3226 PRINT  PAPER 2;AT 3,9;"____
________________"
3230 FOR N=1 TO 12: PRINT  INK 6
;AT N+3,0;"FRET ";N
```




```
3235 NEXT N
3240 FOR N=72 TO 244 STEP 32
3245 PLOT N,40
3250 DRAW 0,112
3255 NEXT N
3260 PRINT ''" A#/Bb C#/Db D#/Eb
 F#/Gb G#/Ab  "
3270 PRINT  INVERSE 1''"PRESS 'M
' TO RETURN TO THE MENU "
3300 IF INKEY$<>"M" THEN  GO TO
3300
3310 RETURN
4000 REM * TRANSPOSING *
4020 RESTORE 3210
4050 BORDER 6: PAPER 6: INK 2: C
LS
4060 PRINT AT 0,6;"TRANSPOSING S
ONGS.": PRINT  OVER 1;AT 0,6;"__
________________"
4070 PRINT AT 2,0;"IT IS OFTEN T
HE CASE THAT THE    KEY THAT A SO
NG IS WRITTEN IN ISUNSUITABLE FO
R YOU. IT COULD BE TOO HIGH,OR T
OO LOW,OR PERHAPS   THE CHORDS AR
E NOT ONES THAT YOUKNOW. THE TAB
LE ON THE FOLLOWINGPAGE ENABLES
YOU TO CHANGE THE   KEY OF A SONG
 SIMPLY.THIS IS THEPROCESS CALLE
D TRANSPOSING."
4080 PRINT ''"TO USE THE TABLE L
OOK DOWN THE  LEFT COLUMN FOR TH
E ORIGINAL KEYAND THE KEY YOU WA
NT TO CHANGE  IT TOO. BY LOOKING
 ACROSS YOU    WILL SEE WHICH CHO
RD IN THE NEW KEY CORRESPONDS TO
 THE ORIGINAL."
4090 PRINT #1; INVERSE 1;"   M=M
ENU   ANY OTHER=CONTINUE  "
4100 IF INKEY$="" THEN  GO TO 41
00
4110 IF INKEY$="M" THEN  RETURN
4120 CLS
```




```
4130 REM * PAGE 2 *
4190 PRINT  INVERSE 1;AT 0,8;"TR
ANSPOSITION CHART";AT 1,5;"KEY"
4200 FOR N=1 TO 9: READ T$
4250 PRINT AT N*2+2,5;T$
4255 PRINT  OVER 1;AT N*2+2,5;"_
_____________________________"
4260 NEXT N
4265 FOR N=39 TO 255 STEP 24
4270 PLOT N,8: DRAW 0,144
4275 NEXT N
4277 PRINT AT 2,5;"____________
_____________"
4280 DATA "C  C  D  E  F  G  A
B  C","D  D  E  F# G  A  B  C# D
","Eb Eb F  G  Ab Bb C  D  Eb","
E  E  F# G# A  B  C# D# E","F  F
  G  A  Bb C  D  E  F","G  G  A
 B  C  D  E  F# G","Ab Ab Bb C
Db Eb F  G  Ab","A  A  B  C# D
E  F# G# A","Bb Bb C  D  Eb F  G
  A  Bb"
4290 FOR x=3 TO 20: PRINT  PAPER
 7;  OVER 1;AT x,5;"  ": NEXT x
4300 PRINT #1;  INVERSE 1;" PRESS
 M FOR MENU      I FOR INFO"
4305 IF INKEY$<>"M" AND INKEY$<>
"I" THEN  GO TO 4305
4310 IF INKEY$="I" THEN  GO TO 4
000
4320 IF INKEY$="M" THEN  RETURN
5000 REM * CHORDS *
5001 PAPER 1: BORDER 1: INK 7: C
LS
5150 PRINT  INK 6;AT 0,6;"20 USE
FUL CHORDS.": PRINT  OVER 1; INK
 6;AT 0,6;"_________________"
5160 PRINT '"THE NEXT PAGE CONTA
INS A LIST OFTWENTY OF THE MOST
COMMONLY USEDCHORDS.BY TYPING IN
 THE NUMBER  OF THE CHORD YOU CA
N SEE HOW IT IS PLAYED.EACH DISP
LAY ALSO HAS THE OPTION OF LISTE
NING TO THE  CHORD."
5170 PRINT  ''"USING THIS COLLEC
TION OF CHORDS IT IS POSSIBLE TO
 PLAY MOST POP SONGS."
5180 PRINT  INK 6; INVERSE 1;AT
20,0;" M FOR MENU  OTHER TO CON
TINUE."
5190 PAUSE 0
5200 IF INKEY$="M" THEN  RETURN
5250 CLS
5300 REM * PAGE 2 *
5430 CLS
5444 FOR X=1 TO 20: PRINT AT X,8
;X: PRINT AT X,12;C$(X)(33 TO 39
): NEXT X
5450 INPUT "ENTER NUMBER OF CHOR
D ";Z
5455 IF Z<1 OR Z>20 THEN  GO TO
5450
5456 CLS
5457 REM *  PAGE 3  *
5460 LET F$=C$(Z)
5500 FOR X=124 TO 244 STEP 24
5510 PLOT X,144
5520 DRAW 0,-120
5530 NEXT X
5540 FOR X=136 TO 24 STEP -24
5550 PLOT 124,X
5560 DRAW 120,0
5570 PLOT 124,144
5580 DRAW 120,0
5590 NEXT X
5600 PRINT AT 2,15;"E";AT 2,18;"
A";AT 2,21;"D";AT 2,24;"G";AT 2,
27;"B";AT 2,30;"E"
5700 PRINT AT 21,15;F$(1 TO 2);A
T 21,18;F$(3 TO 4);AT 21,21;F$(5
 TO 6);AT 21,24;F$(7 TO 8);AT 21
,27;F$(9 TO 10);AT 21,30;F$(11 T
O 12)
5750 LET C=VAL F$(13 TO 14)
5760 LET D=VAL F$(15 TO 16)
5770 IF F$(17)="B" THEN  FOR A=D
 TO 30 STEP 3: PRINT AT C,A;"B":
 NEXT A
5780 PRINT AT C,D;F$(17)
5790 LET C=VAL F$(18 TO 19)
5800 LET D=VAL F$(20 TO 21)
5810 PRINT AT C,D;F$(22)
5820 LET C=VAL F$(23 TO 24)
5830 LET D=VAL F$(25 TO 26)
5840 PRINT AT C,D;F$(27)
5850 LET C=VAL F$(28 TO 29)
5860 LET D=VAL F$(30 TO 31)
5870 PRINT AT C,D;F$(32)
5890 PRINT  INVERSE 1;AT 5,3;F$(
33 TO 39)
5900 PRINT  INVERSE 1;AT 12,0;"M
```

```
=MENU          ";AT 13,0;"A=ANOTH
ER CHORD";AT 14,0;"H=HEAR CHORD
 "
5910 INPUT T$
5920 IF T$="M" THEN  RETURN
5930 IF T$="A" THEN  GO TO 5430
5960 IF T$<>"M" AND T$<>"A" AND
T$<>"H" THEN  GO TO 5910
6000 IF Z=2 OR Z=17 THEN  PAUSE
50: BEEP 1,VAL F$(40 TO 42): BEE
P 1,VAL F$(43 TO 45): BEEP 1,VAL
 F$(46 TO 48): BEEP 1,VAL F$(49
TO 51)
6010 IF Z=9 OR Z=10 THEN  PAUSE
50: BEEP 1,VAL F$(40 TO 42): BEE
P 1,VAL F$(43 TO 45): BEEP 1,VAL
 F$(46 TO 48): BEEP 1,VAL F$(49
TO 51): BEEP 1,VAL F$(52 TO 54)
6020 IF Z<>2 AND Z<>17 AND Z<>9
AND Z<>10 THEN  PAUSE 50: BEEP 1
,VAL F$(40 TO 42): BEEP 1,VAL F$
(43 TO 45): BEEP 1,VAL F$(46 TO
48): BEEP 1,VAL F$(49 TO 51): BE
EP 1,VAL F$(52 TO 54): BEEP 1,VA
L F$(55 TO 57)
6030 GO TO 5910
9000 REM *  DATA  *
9050 RESTORE 9000
9100 FOR N=0 TO 7: READ A: POKE
USR "A"+N,A: NEXT N
9120 DATA 64,64,72,84,100,72,80,
96
9210 DIM C$(20,57)
9220 LET C$(1)="E A E A C#E  921
1 9242 92730000 A MAJOR-20-15-08
-03001004"
9230 LET C$(2)="X X E A C#G  921
B 000  000 12302A SEVEN-08-03001
006000000"
9240 LET C$(3)="E A E A C E  627
1 9212 92430000 A MINOR-20-15-08
-03000004 "
9250 LET C$(4)="F#B F#B D#F# 915
B152121524315274B MAJOR-18-13-06
-01003006"
9260 LET C$(5)="F#B D#A B F# 621
1 9182 9243 9304B SEVEN-18-13-09
-03-01006"
9270 LET C$(6)="F#B F#B D F# 930
1122721521315244B MINOR-18-13-06
-01002006"
9280 LET C$(7)="G C E G C E  627
1 92121218312154C MAJOR-17-12-08
-05000004"
9290 LET C$(8)="G C E BbC E  627
1 92121218312244C SEVEN-17-12-08
-05000004"
9300 LET C$(9)="X A D A D F# 924
1 9302122730000 D MAJOR-15-10-03
002006000"
9310 LET C$(10)="X A D A C F# 62
71 9242 93030000 D SEVEN-15-10-0
3000006000"
9320 LET C$(11)="X A D A D F  63
01 9242122730000 D MINOR-15-10-0
3002005"
9330 LET C$(12)="E B E G#B E  62
41 9182 92130000 E MAJOR-20-13-0
8-04-01004"
9340 LET C$(13)="E B E G#D E  62
41 9182 921312274E SEVEN-20-13-0
8-04002004"
9350 LET C$(14)="E B E G B E  92
12 91830000 0000 E MINOR-20-13-0
8-05-01004"
9360 LET C$(15)="F C F A C F  61
5B 92421218312214F MAJOR-19-14-0
7-03000005"
9370 LET C$(16)="F C EbA C F  61
5B 9242121830000 F SEVEN-19-12-0
9-03000005"
9380 LET C$(17)="F C F AbC F  61
5B12182122130000 F MINOR-07-0400
0005000000"
9390 LET C$(18)="G B D G B G  91
8212153123040000 G MAJOR-17-13-1
0-05-01007"
9400 LET C$(19)="G B D G B F  63
01 9182121530000 G SEVEN-17-13-1
0-05-01005"
9410 LET C$(20)="G D G BbD G 121
5B18183182140000 G MINOR-17-14-1
0-05002007"
9420 RETURN
9500 FOR X=74 TO 154 STEP 16
9510 PLOT X,144
9520 DRAW 0,-80
9530 NEXT X
9540 FOR X=136 TO 72 STEP -16
9550 PLOT 74,X
9560 DRAW 80,0
9570 PLOT 74,144
9580 DRAW 80,0
9590 NEXT X
9600 PRINT  INVERSE 1;AT 2,9;"E"
;AT 2,11;"A";AT 2,13;"D";AT 2,15
;"G";AT 2,17;"B";AT 2,19;"E"
9610 RETURN
9800 PLOT U,15: DRAW 0,15
9810 PLOT U+2,15: DRAW 0,15
9820 RETURN
9950 REM *   OPENING/CLOSING    *
           *        GRAPHICS    *
9980 FOR A=0 TO 43: LET X=70*SIN
 A: LET Y=70*COS A
9985 PLOT 128,88: DRAW X,Y,PI: N
EXT A
9986 RETURN
```



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Moonlander

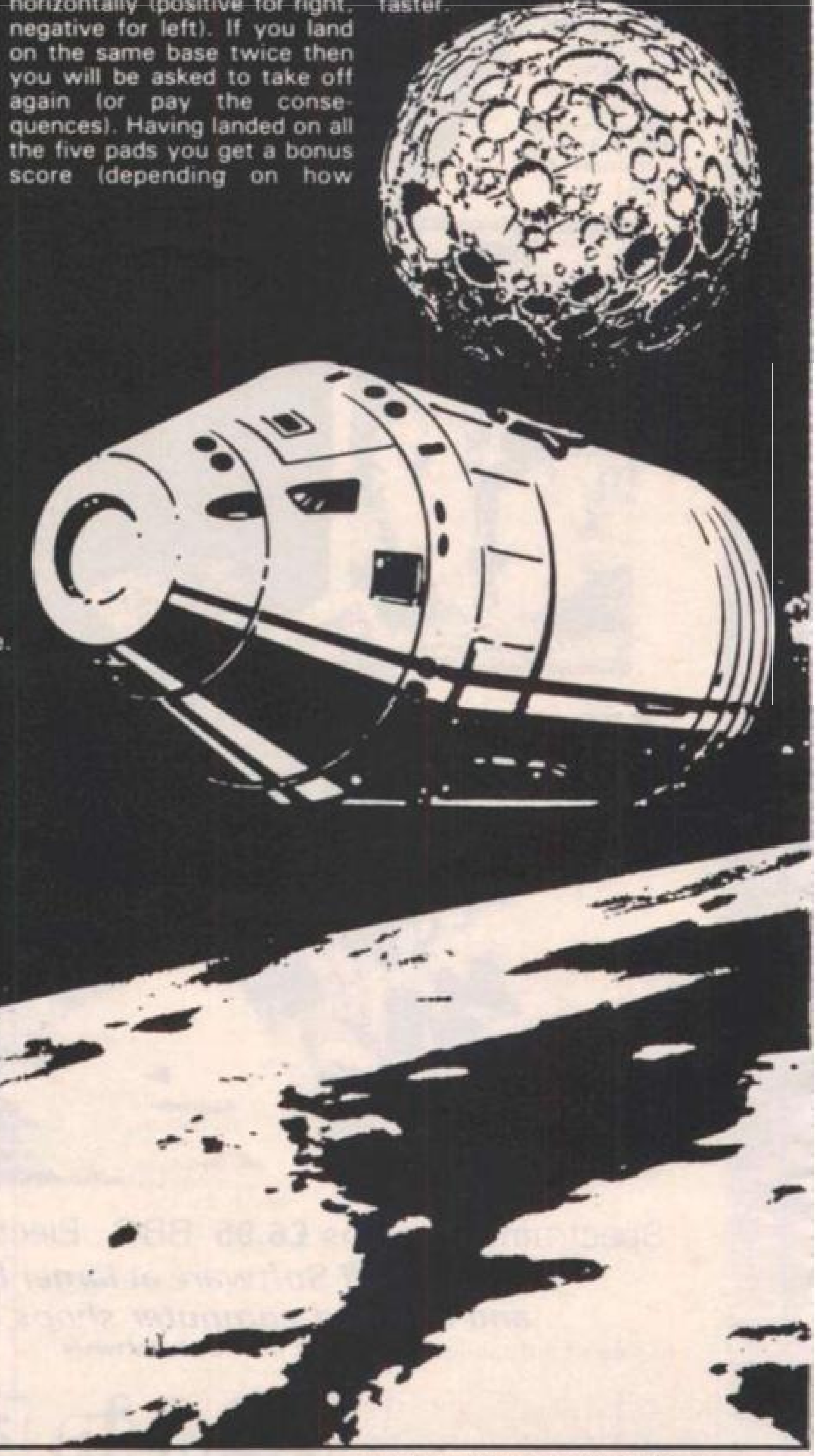
A superior version of the arcade favourite from Gary Moore in Essex.

This really is a special version of the classic lander game. Just like the original, this game uses long range and close up views of the lander and moonscape, depending on the lander's proximity to the mountains.

The aim of the game is to land your moonlander on all the five landing pads (shown as flashing Xs). There are no on screen instructions as these had to be omitted to fit the program into 16K, so here is a brief outline.

Using the "9" key is as the thrust and the "7" and "8" keys to rotate the moonlander left and right, guide the moonlander to a safe landing on one of the landing pads. Having landed once on each of the five landing pads, you start again but at a harder level.

When the program is first run you will see a landscape showing the positions of all five landing pads. When you are a certain distance from a pad the landscape will change to a magnified view of the pad and the surrounding landscape. To make a successful landing your vertical speed should be less than or equal to 10 (the vertical speed (v/speed) is negative if the moonlander is going upwards and positive if going downwards). The horizontal speed (h/speed) is the speed at which you are travelling horizontally (positive for right, negative for left). If you land on the same base twice then you will be asked to take off again (or pay the consequences). Having landed on all the five pads you get a bonus score (depending on how much fuel you have left), an extra moonlander and your fuel tanks topped up. You then try to land on the five pads again, but this time your rate of fall is faster.



Variables

lv	Level.
sc	Score.
z	Number of landers left.
l	Counts the pause between the blip sounds.
vs	Vertical speed.
hs	Horizontal speed.
pad	Number of pads landed on.
f	Fuel left.
ls	RESTORE number for landscape data.
h	Line number of landing pad when in magnify mode.
d	Column number of landing pad when in magnify mode.
line	Line number for lander.
column	Column number for lander.
drift	If positive then lander moves to the right, if negative then moves to left, if zero then stays in column.
gs	Character code for graphic of lander.
down	If positive then lander goes down, if negative then lander goes up.
s	Equals 1 if in magnify mode, 0 if in normal mode.
Array c	If c(line + column) = 1 then pad has already been landed on.
pl	Previous line number of lander.
pc	Previous coloumn number of lander.

Program description

10- 70	Sets up variables.
100- 410	Main program, broken down as follows:
115	Prints information on screen.
116	Checks for landing.
120	Prints lander.
125	Checks for crash.
130- 145	Updates print position.
150- 155	Updates horizontal and vertical movements.
160- 180	Decides which position lander should face.
190	If key "9" is pressed then subtract 10 from fuel.
200- 210	Checks if lander is at edge of screen. If it is then GO TO 700.
220	Stops lander going off top of screen.
230	Updates horizontal and vertical speeds.
235- 250	Checks for change of landscape.
290	If no fuel left THEN GO TO 950.
400	Deletes lander.
410	Starts lines 100-410 again.
500- 580	Magnifies landscape.
600- 696	Checks for landing, crash landing, restricted landing pad and to see if all pads have been landed on.
700- 795	In magnified mode, if lander is at edge of screen then draw new maginified landscape next to the one the lander is now in.
800- 895	Crash landing display. If no more landers left then end of game.
900- 940	Landed on all 5 pads, bonus score, restart program but at slightly harder level.
950- 960	Routine for "OUT OF FUEL".
9000-9060	UDGs for lander.
9500-9999	Data for shape of landscape.
9530	Data for starting landscape.
9540	Data for magnified area around base 1 (from left to right).
9550	Data for magnified area around base 2.
9560	Data for maginified area around base 3.
9570	Data for magnified area around base 4.
9580	Data for magnified area around base 5.



```
  10 REM Set Up Variables
  20 PAPER 0: BORDER 0: CLS : IN
K 4
  30 LET lv=.5: LET sc=0: LET z=
3: LET l=0: LET vs=30: LET hs=21
  35 GO SUB 9000
  36 LET pad=0: LET f=3000: DIM
c(30)
  40: LET ls=9530: LET h=0: LET
d=0: LET line=2: LET column=10:
LET drift=3: LET gs=147: LET dow
n=4: LET s=0
  60 GO SUB 9500
  70 PRINT  AT 14,4; FLASH 1;"x"
; AT 20,9;"x"; AT 17,15;"x"; AT
15,21;"x"; AT 19,24;"x"
 100 REM ▌Run Program
 110 INK 7
 115 PRINT  AT 0,0; INVERSE 1; I
NK 6;"v/speed: ";vs;"     "; AT 0
,15;"h/speed: ";hs;"     "; AT 0,
31;z;#0; INVERSE 1; INK 6; AT 0,
0;"fuel: ";f;"
  "
 116 IF  INT line=h-2 AND ( INT
column=d OR  INT (column+.5)=d)
THEN  GO TO 600
 120 PRINT  AT line,column; CHR$
 gs
 125 IF  ATTR (line+ SGN vs,colu
mn+ SGN drift)=4 OR  ATTR (line,
column+ SGN drift)=4 THEN  GO TO
 800
 130 LET pc=column: LET pl=line
 140 LET column=column+ SGN drif
t
 145 LET line=line+lv* SGN vs*(
ATTR (line+ SGN vs,column) <> 13
2)
 150 LET drift=drift+( INKEY$ ="
9" AND gs=146)-( INKEY$ ="9" AND
 gs=144)
 155 LET down= SGN (down+( INKEY
$ ="9" AND gs=145)-( INKEY$ ="9"
 AND gs=147)-down*( INKEY$ =""))
 160 LET gs=gs+( INKEY$ ="7")-(
INKEY$ ="8")
 170 IF gs=148 THEN  LET gs=144
 180 IF gs=143 THEN  LET gs=147
 190 IF  INKEY$ ="9" THEN  LET f
=f-10
 195 IF  INKEY$ ="9" THEN  BEEP
.08,20
 200 IF column >= 30 THEN  GO TO
 700
 210 IF column >= 0 AND column<1
 THEN  GO TO 760
 220 IF line=1 THEN  LET line=2
 230 LET vs=vs+5+15*down: LET hs
```

```
=drift*7
 235 IF s <> 0 THEN  GO TO 250
 240 IF line >= 12 AND s=0 THEN
 GO TO 505
 250 IF s=1 AND line <= 2 THEN
RESTORE 9530: LET column=(column
/3.1)+22*(ls=9580)+19*(ls=9570)+
11*(ls=9560)+6*(ls=9550): LET ls
=9530: CLS : INK 4: LET line=11:
 LET s=0: GO TO 60
 270 IF l=6 THEN  BEEP .08,40: L
ET l=0
 275 LET l=l+1
 280 IF line <= 2 THEN  LET line
=2
 290 IF f=0 THEN  GO TO 950
 400 PRINT  AT pl,pc;" "
 410 GO TO 100
 500 REM ▌Change Scenery
 505 LET column= INT column
 510 LET ls=9530+10*(column>0 AN
D column<7)+20*(column>6 AND col
umn<13)+30*(column>12 AND column
<18)+40*(column>17 AND column<22
)+50*(column>21 AND column<31)
 520 CLS : INK 4: LET line=2: RE
STORE ls
 530 GO SUB 9500
 540 LET h=6*(column>0 AND colum
n<7)+21*(column>6 AND column<13)
+16*(column>12 AND column<18)+9*
(column>17 AND column<22)+21*(co
lumn>21 AND column<31)
 550 LET d=12*(column>0 AND colu
mn<7)+9*(column>6 AND column<13)
+12*(column>12 AND column<18)+16
*(column>17 AND column<22)+6*(co
lumn>21 AND column<31)
 560 PRINT  AT h,d; FLASH 1;"X"
 565 LET column=column-6*(column
>21)-5*(column>17)-5*(column>12)
-6*(column>6)
 570 LET column=column*3.1: LET
s=1
 580 GO TO 100
 600 REM ▌Landing
 620 IF gs <> 147 OR vs>10 THEN
 GO TO 800
 630 IF c(line+column) <> 1 THEN
  GO TO 680
 640 PRINT  AT 21,0;"RESTRICTED
LANDING PAD. GO AWAY."
 650 FOR i=1 TO 500
 660 IF  INKEY$ ="9" THEN  LET h
=0: GO TO 100
 670 NEXT i: GO TO 800
 680 PRINT  AT 10,7;"GREAT LANDI
NG"; AT 11,6;"CONGRATULATIONS!"
 690 LET c(line+column)=1: FOR i
=1 TO 4: FOR j=0 TO 10: BEEP .08
,j: NEXT j: NEXT i: RESTORE 9530
: CLS : INK 4
 693 LET sc=sc+100
 695 LET pad=pad+1: IF pad=5 THE
N  GO TO 900
 696 GO TO 40
 700 REM ▌Crossing Boundaries
 710 IF ls=9530 THEN  LET column
=1: GO TO 400
 720 LET ls=ls+10
 730 IF ls=9590 THEN  LET ls=954
0
 740 CLS : RESTORE ls: INK 4
 750 LET column=(ls=9540)+8*(ls=
9550)+13*(ls=9560)+18*(ls=9570)+
22*(ls=9580): GO TO 530
 760 IF ls=9530 THEN  LET column
=29: GO TO 400
 770 LET ls=ls-10
 780 IF ls=9530 THEN  LET ls=958
0
 790 CLS : RESTORE ls: INK 4
 795 LET column=6*(ls=9540)+12*(
ls=9550)+17*(ls=9560)+21*(ls=957
0)+29*(ls=9580): GO TO 530
 800 REM ▌Crash Landing
 820 PRINT  AT line-1,column-1;"
\~["; AT line,column-1;"-*."; AT
 line+1,column-1;"~(:"
 830 BEEP .08,0: BEEP .08,5: BEE
P .08,3
 840 PRINT  AT line-1,column-1;"
   "; AT line,column-1;"   "; AT
 line+1,column-1;"   "
 850 PRINT  AT 10,7;"CRASH LANDE
D": LET z=z-1: IF z=0 THEN  GO T
O 870
 860 RESTORE 9530: PAUSE 200: CL
S : INK 4: GO TO 40
 870 PRINT  AT 2,10;"Your Score:
";sc
 875 PRINT  AT 10,0;"
  GAME OVER            "; AT 11,11
;"Press any key"
 880 IF  INKEY$  <> "" THEN  GO
TO 880
 890 IF  INKEY$ ="" THEN  GO TO
890
 895 RUN
 900 REM ▌Finish Game
 905 LET sc=sc+f
 910 CLS : INK 7: PRINT  AT 5,1;
"Well done , you have landed on
 all the pads with a score of ";
 AT 8,12; FLASH 1;sc
 920 IF z=0 THEN  PRINT  AT 12,3
,"Press any key to start": PAUSE
 0: RUN
 930 LET z=z+1: LET lv=lv+.5
 940 PAUSE 200: CLS : INK 4: GO
```

```
TO 36
 950 PRINT  AT 10,7;"OUT OF FUEL
": LET z=0: PAUSE 200
 960 GO TO 870
9000 REM ▌Lander Graphic
9010 FOR i=1 TO 4: READ n$: FOR
j=0 TO 7: READ n: POKE  USR n$+j
,n: NEXT j: NEXT i
9020 DATA "a", BIN 00000101, BIN
 00001111, BIN 01101101, BIN 111
11100, BIN 11111100, BIN 0110110
1, BIN 00001111, BIN 00000101
9030 DATA "b", BIN 11100111, BIN
 01000010,255, BIN 01111110, BIN
 00011000, BIN 00111100, BIN 001
11100, BIN 00011000
9040 DATA "c", BIN 10100000, BIN
 11110000, BIN 10110110, BIN 001
11111, BIN 00111111, BIN 1011011
0, BIN 11110000, BIN 10100000
9050 DATA "d", BIN 00011000, BIN
 00111100, BIN 00111100, BIN 000
11000, BIN 01111110,255, BIN 010
00010, BIN 11100111
9060 RETURN
9500 REM ▌Moonscapes
9510 READ x,y: PLOT x,y
9520 FOR n=0 TO 25: READ h,v: DR
AW h,v: NEXT n
9530 DATA 0,31,16,0,16,32,8,0,8,
8,16,-48,8,-8,8,0,8,16,16,8,8,16
,8,-16,8,0,2,8,2,0,4,8,16,16,8,-
24,8,8,8,0,16,-32,8,0,16,40,8,-8
,16,-8,8,16,6,-8
9540 DATA 0,31,48,0,48,96,24,0,2
4,24,48,-128,24,-16,24,0,8,16,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0
9550 DATA 0,153,48,-128,22,-18,2
4,0,24,48,48,24,24,48,24,-48,24,
0,6,12,4,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0
9560 DATA 0,31,48,24,24,48,22,-5
6,24,0,6,12,6,0,6,24,48,48,24,-7
2,24,24,16,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0
9570 DATA 0,55,6,24,6,0,12,24,48
,48,24,-72,24,24,24,0,48,-96,24,
0,32,104,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0
9580 DATA 0,103,40,-96,24,0,56,1
20,24,-24,48,-24,24,48,32,-24,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0
9999 RETURN
```

Reader's reviews

Tell us what you think about the software that's on the market.



This feature provides space for you to air your views on any software, be if for the ZX80, ZX81 or ZX Spectrum. If you've had a good or bad experience of any of the commercial software packages available for your micro, why not write and tell us.

Your reviews should contain your critical thoughts about the software and the relevant details concerning the availability of the package, the price etc. If you can provide any screen dumps to illustrate the review, so much the better. Any reviews published in this section of the magazine will be rewarded with the price of the tape you review. So, if you buy a cassette and send in a review that gets published, you'll get your software for free!

Ground Force Zero
Titan Programs
Guy Haines

The lengths to which some companies go to in advertising their product, in terms of magazine space, makes you think they have something special to offer. A full page colour advertisement of this type prompted me to buy Ground Force Zero from Titan programs. However, the game simply reaffirms my belief in the old adage 'you can't judge a book by its cover' or in this case 'don't be influenced in purchasing programs by the advertising campaign behind it'.

Ground Force Zero is written totally in BASIC, and suffers all the accompanying problems of programming in this language. On loading you are greeted with the 'Dambusters' theme music and a second world war biplane chugging across the screen with a prompt asking you to select 1 of 10 levels of difficulty. Then, at the bottom of the screen, skyscrapers of varying height are being constructed and when the bottom of the screen is fully occupied by buildings, your plane begins chugging along the top of the screen once again. As it goes off one side of the screen it reappears at the other but this time it is one line lower. Using simply the 'B' key you must drop bombs on the buildings knocking them down to the ground before your decreasing height causes you to collide with one.

Being written is BASIC, the graphics are crude and jerky and the monotony of having only a single key to press brings boredom almost immediately. In my opinion it is the sort of game that you feel you could have whipped up yourself and then put it on some tape and stored away never to be used again. It would appeal to the very young in testing their judgement for the right moment at which to drop their bomb but in todays market, where to stay afloat in the software industry demands high standards, I am surprised that Titan Programs have not been renamed Titanic. At £5 a throw the program is ludicrously priced but it did teach me a lesson. From now on, I'll find out what I'm getting before I part with any money!

Slippery Sid
Silversoft
P D Jones

The majority of programs available for the 16K Spectrum come in attractive packages and Slippery Sid is no exception. However, often an attractive cover can conceal a poor or even bug-ridden program. Fortunately, this program lives up to all expectations. Basically simple in concept, the game is incredibly addictive.

On running you are seen to be in a walled garden in which a number of frogs are sitting. You take the role of Slippery Sid the snake and your aim is to gobble up all the frogs. But beware! Every time you eat a frog, a white toad will appear at random in the garden. Also, the more frogs you eat, the longer you grow and the harder it becomes to get around the screen. Occasionally a magic mushroom will appear and on eating this you can gobble up a toad and gain extra points. On eating all the frogs, the screen clears and you find yourself in the next garden which contains an extra wall. The game continues as before with more walls and hazards added each time you clear a screen. The control keys are well chosen and a high score can be achieved quite quickly. The battle is not over yet though as you have the choice of five levels of speed — from manageable to well-nigh impossible!

All in all, Slippery Sid is a very enjoyable game with good use of sound and graphics. I highly recommend it but would warn those of you who are married that it can cause marital stress. I am still trying to pry my wife away from the keyboard so that I can have another go. Slippery Sid is available from most good software stockists at £5.95.

3D Tunnel
New Generation Software
S Brookes

New Generation's latest contribution to the software market is the highly recommended 3D Tunnel. On the cassette there are two versions of the game available, 16K and 48K. The 16K version comes in two parts, playing sequences and practice modes which have to be loaded separately. The 48K version has the added attraction of a demonstration mode (which anyone could watch for a long time in fascination) and a London Underground train to avoid.

The whole object of the game is to shoot as many assorted creatures as possible, and to avoid the underground train (48K only). Points are awarded as follows:

Hitting a bat	20 points
Hitting a toad	40 points
Hitting a spider	60 points
Hitting a rat	80 points
Avoiding the underground train	100 points

Provision has been made within the program for the use of joystick control — Kempston Microelectronics and AGF are to be used. If the user does not have this facility, the normal keyboard can be used with a varying combination of control keys.

When the program is loaded, you are greeted with an options page. This shows the selection of speeds available — fast, medium, or slow. There are also practice modes for each phase of the game:

Phase 2 Crawling spiders
Phase 3 Leaping toads
Phase 4 Scurrying rats
Phase 5 London Underground train (48K only)











Anyone of these modes can be selected along with the speed to start the practice sequence.

Highly recommended maybe, but my first disappointment came with the start of the game — the so-called 3D Tunnel is no more than variating borders of colour whizzing towards you (depending on the selected speed). I would have liked to have seen, at the least, vanishing points at the corners of the tunnel walls to give the view more perspective although actual graphics within the game are superb.

My second disappointment came when I first started to play the game; the first phase, Flapping bats, has no end! I have sat at my Spectrum for twenty solid minutes without managing to complete this phase. I find this very discouraging — surely the actual game is not another practice mode?

At £5.95 3D Tunnel is good value to anyone who is prepared to sit at the computer for hours just to reach the other end of the tunnel!

Apocalypse
Red Shift
Greg Turnbull

Apocalypse is the new strategic wargame program for 2-4 players from Red Shift. The program comes in a sturdy box with a full 16 page user manual. Tape side A loads the main program and the prompt to load one of the four available maps on side B (Europe, Great Britain, the Caribbean and London). Once the map is loaded you must select the play date from 0 to 7999 AD, the number of players' names (and symbols for the map display), then select the empire centres (of the 24 names offered). Each centre (and all squares) is worth between 0 and 9 revenue points, depending on the location (desert: low, centre: high). These points are the currency of the game.

The screen shows the year and quarter currently being played, player number and decision information, main map plus symbols for each players' areas, the player's power points (sum total of all revenue points) and an exploded window of the current cursor position plus surrounding squares. At the start of each quarter the power points give each player a revenue which he can spend on troops, warships or nuclear missiles. There are four phases to each quarter:

1 Nukes phase where nukes can be be seen on the map and launched if required. (If this is done, the target square is destroyed and all 8 surrounding squares as well.)
2 Deployment phase where the player can build up armies or fleets on the squares he owns.
3 Movement phase where the player can move any army or fleet to occupy new territory (and so build up his total revenue points), or may attack another player's area. (Movement of each force is limited to a certain amount for each turn). If an attack is made, the Combat phase occurs where both players can choose a number (from 1 to 9) without letting each other see the value chosen. This then determines who wins the conflict (alternatively the computer can be left to make the decision).
4 End Turn phase where a player may challenge the next to concede.

During the main deployment/movement phases of the game, the exploded window is used to observe the strengths of each square (this is scrolled at a rate of 1 or 3 squares, in any direction, by the use of cursor keys). Victory can be decided by the number of names of the centres captured, or the total number of revenue points built-up, or the destruction of the opponent's forces.

The program is a complex wargame that can last from a few hours to a few days depending on how involved you get with it, as it is highly addictive. Luckily, a save game facility is included. It is also easy to break in and list the program with LIST 2, this is endorsed by Red Shift as they welcome any ideas on improvements to the program and will even supply a listing if you send an sae.

If you get tired of playing on one map there are three others to choose from, although every game will of course be different — unlike arcade games. Each map demands different tactics: the Caribbean needs warships and control of the ports, Great Britain relies more on the troop movements. Also, the Nukes option does not have to be used in a game.

If after many weeks of play you need other maps or you are getting too used to them, there are expansion tapes available. Volume 1 contains maps for USA, SE Asia, Africa, Arctic Circle, Star systems and Nether Earth. Volume 2 has historical scenarios such as the fall of Rome, Napoleon's campaigns, the Pacific War and 1984. Red Shift say that they will be altering the rules of play in these further expansions to add to the interest for seasoned players. Plus if you need any help there is a telephone number to ring for advice from Dr Strangelove!

Overall, at £9.95, this is an excellent program which will give you many hours of enjoyment especially as the game is constantly expanding and looking for ways in which to be improved. As such, it is highly recommended but it must be noted that some of the recent tapes will not load due to poor tape duplication processes. If you get one of these tapes (as I did) then just telephone Red Shift and they will very quickly replace the tape.

The Golden Apple
Artic Computing
Stuart Rogerson

The Golden Apple is the fifth of Artic Computing's adventure ▶

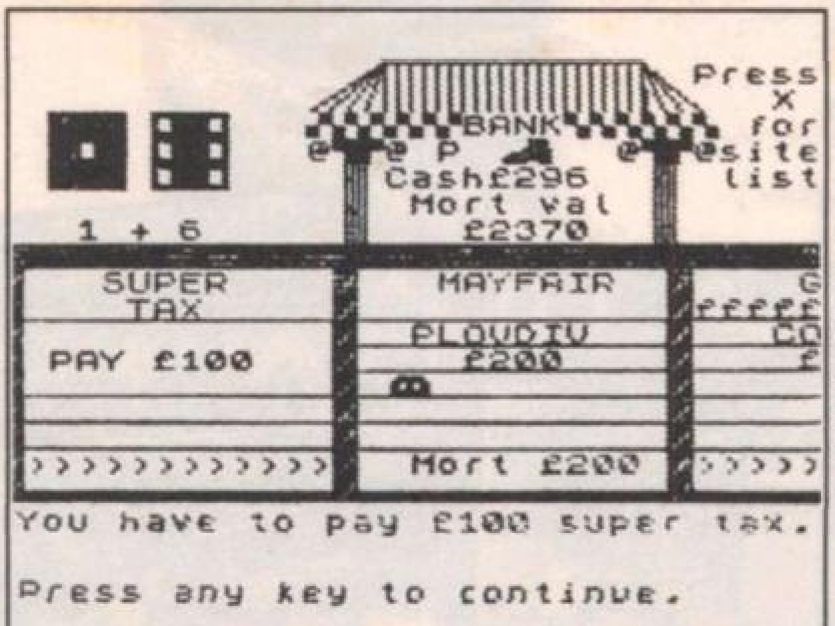
games and the first to include colour and sound. The program begins with a colourful picture of the main locations of the adventure, a mansion house, a ship and a mountainous island.

The plot is simple — you are on quest to find The Golden Apple and on the way you must find thirteen treasures and a safe place in which to deposit them. This is not the kind of adventure where you are killed in every second location and meet strange monsters round every corner. Rather, it is a test of skill, insight and ingenuity. You will find yourself seeking water to fill a watering can to water seeds or fishing for salmon (assuming you find the net) and be left puzzling over the unpleasant crocodile.

The program understands over one hundred and fifty words and although a fairly standard textual adventure, it contains three new features for Artic. By requesting instructions you are given a page of useful hints including some of the key words and advice on which abbreviated entries are acceptable. Requesting help produces the message "What and spoil your fun!" followed by Artic's address and the promise of a crib sheet if you really get stuck. Asking for your score not only produces an update on the treasure position but gives you a rating out of one hundred and tells you the number of turns you've had so far. The latter might seem a nice but irrelevant touch but it isn't as I soon discovered.

The whole point of adventure games is to explore new worlds and use your wits to survive, finding uses for the various objects you see lying around. This is a high quality adventure game which more than fulfills this aim. It is for the experienced adventurer only. If you are an adventure game enthusiast it is certainly one worth considering adding to your collection. It is for the 48K Spectrum at £6.95 and the ZX81 at £5.95. Like all Artic adventures so far, The Golden Apple is completely machine code and includes a save routine. Two hints: beware of sunset and don't be tempted by the nice soft bed!

Go To Jail
Automata
Philip Hickling



Screen display from Go To Jail from Automata.

Go To Jail for the 48K Spectrum was originally marketed as "Automonopoli" but the name was changed, if their advertisements are to be believed, for reasons of copyright. It is written largely in BASIC, with several machine code routines to scroll part of the screen one pixel at a time, create fancy border patterns and store and retrieve the screen from above RAMTOP so saving time building up the screen.

The program simulates the board game for between two and five players — one can be the computer if requested, thus one human can play against the computer. Whether the computer is an active player or not, it takes upon itself the role of banker, keeping account of all the player's money, property owned, and collection of fines and taxes etc. The game is authentic in virtually all details to the original, even down to the captions on the chance cards!

At any time during the normal course of play, the screen displays two and a bit squares of a monopoly board in a large format, scrolling them from right to left as the player advances. While at times this may be confusing, the sites are large and the text easy to read — if the whole board was to be displayed the information would be compressed to an unreadable degree. On the sites are shown the name, owner, rent and mortgage value. Also shown during a player's turn is the bank, giving details of the player's cash and mortgage value. If during the course of play a player becomes bankrupt, his property is repossessed by the bank and is up for action, as happens when a player lands on property that is for sale and does not buy it. During these auctions, the computer will make its own bids, according to how highly it rates the value of the property.

The computer plays a fairly skilful game, especially when it has only one opponent. If the player has very little cash on hand, it will take advantage of offering the site up for auction then making a bid just higher than the player can afford so buying half the board at ridiculous prices!

The game incorporates various facilities. Players can trade with each other bypassing the bank, houses and hotels can be bought at will and the game can be saved at any time — usually an essential feature! There are very few unfavourable points in the program. It is possible in a couple of places to cheat but the computer does not use these and all that is needed to overcome them is a little self-discipline on the part of the player. The only major complaint I can make against the program is its limited use of sound.

These drawbacks, however, are easily countered by the excellence of the program in other areas. Overall, it is extremely good value for £6 and I can recommend it to both seasoned addicts and newcomers to the game alike.

Avenger
Abacus Programs
Mark Davies

Dear readers, if you have been looking for an excellent arcade-type scramble then buy Avenger from Abacus Programs. It's really the best scramble program I have seen available for the 16K ZX81.

The game loads every time and once loaded, runs automatically displaying the instructions and which keys to use. Then, when you have pressed 'p' as you are told, the next screen of instructions are shown and the points awarded for each target. You then enter the skill level and set off on your intrepid mission.

You fly over mountainous terrain hurtling bombs or lasers at the ground. They are both accurate and the computer responds quickly to key depression (which is just as well!) Guided missiles are launched against you and are only destroyed by bombs whereas factories and missile pads can be flattened by both sorts of ammunition. Watch out! If you miss the guided missles they are sure to get you!

Your plane can be hit as many as five times before you are destroyed but a hit from a missile counts as two shots. You can also be killed by the atomic explosion resulting from the destruction of a power station. As if this isn't enough, interceptors will attack you from all directions and they are hard to destroy as you only have your lasers for defence and they are no match for their rockets. If you manage to score more than 5000 by the time your fifth plane is destroyed then you have beaten the planet at that level.

At the highest level, level 5, the game is very, very fast. Not only are there more guided missiles and interceptors to deal with but your laser is shortened, making it much harder to destroy the interceptors. In addition, there is a high score facility for every level and a hit/time ratio which tells you the average hits you have made in your allotted time.

Avenger, at £4.95 from Abacus Programs is great value for money and really releases the full potential of the 16K ZX81.

Manic Miner
Bug Byte
Bruce Boughton

This excellent title is a must for ALL arcade enthusiasts. At £5.95 it is well worth a couple of weeks pocket money.

While loading, we are met by a continous rotation of the words MANIC and MINER in large letters which alternate in colour. Once loaded we can hear a fascinating tune played on a piano keyboard with the

keys visibly being played.

On the inlay we are told that miner Willy (that's us) has found a long-lost mine and has to bring out all the treasure he discovers there. We have a choice of keys, but I found that Q ti go left, W to go right and space to jump (with A to pause) are the best keys for the job. We also have a choice of having the tune (Hall of the Mountain King) on or off while we play.

So, onto the game itself. On pressing 'enter', the first cave (called the Central Cavern) flashes up instantly. We are in the bottom left-hand corner and have to get all the keys that are placed in awkward positions around the rest of the screen. This is not as easy as it seems as there are nasties like poisonous pansy bushes all over the place which must be jumped over or otherwise avoided at all costs. A mad mining-robot must also be missed as an added peril. Conveyeor belts also must be negotiated as well as disintegrating floors. If these are not enough complications for you then I'll add that you have a limited air supply, which only takes about 2½ minutes to run out.

If you safely get all the keys and manage to return to the lowest level, you can go through the flashing door into the next sheet. You get a bonus depending on how much air you have left, with the keys at 100 points each. If you get killed for the third time a boot comes down on the end of a very long leg and steps on you. What a good idea!

If you make it through the first cavern you have got another 19 more caves to go through before you reach home, each one progressively harder. Cave 2, the 'cold room', has penguins on ice skates after you, and rather than keys you have to get snowshoes. The third cave, the 'Menagerie', obviously got its name from the three emus which eagerly patrol the different levels. Deadly spiders appear for the first time on this sheet, making it even harder.

My favourite cave (also the furthest I can get) is 'Eugene's Lair', cavern number 5. In this we must obtain five bricks to get to the next cave. Eugene is a small round man with stubby legs and glasses and is clearly named after a certain well known programmer. He does his best to stop you getting all the bricks, as do the ferocous toilets, which are complete with flapping seats.

This game is highly addictive as there is always the motivation to try and reach the next cavern. Each cave holds its own secret, which must be learned before any progress can be made.

Well done to Mathew Smith for writing an ingenious program with such super graphics, and thanks to Bug-Byte for issuing it. All in all, an excellent game for the 48K Spectrum.

Super C Complier
Softek
Mcoder 2 Compiler
PSS
David Harrison

Wouldn't it be lovely to write a program in "slowly but surely" Sinclair BASIC and, at the touch of a button, convert it into machine code to run at between 20 and 100 times the original speed? Well, that's what Softek and PSS claim in their adverts for these two compilers. But do they work?

Both compilers cost £9.95 but each has its own characteristics and idiosyncrasies. There are some things, however, that both compilers have in common. Both work with integer numbers only and can handle numbers from −32768 to 32767, while Super C also handles numbers from 0 to 65536 on a simulated INPUT.

Most BASIC commands can be compiled, with a few exceptions. Neither complier can handle LOAD, SAVE, VERIFY or string arrays. However, MCoder 2 can handle strings (but not string splicing), where Super C can't. This is the big difference between the two utilities. The Super C manual does tell you how this can be done but it is fiddly, involving PEEK and POKE.

MCoder 2 can also handle numeric arrays (one dimensional), LEN, LPRINT and INPUT. Super C cannot cope with these but instead, can use STEP in FOR-NEXT loops and SCREEN$ (with code), where MCoder 2 can't.

RND is special on each compiler, giving an integer number between 0 and 32767. This is fiddly to work into a BASIC program but, on MCoder 2, you can simulate this function with:

```
LET R = USR 59997
```

This is useful when testing your BASIC program before compilation.

REM, on both compilers, is put to very good use. On Super C, you can use REM to enable the BREAK key to run machine code (which follows the REM in the line, in decimal), or to erase everything, including the Compiler, without pulling the plug. (Both compilers can survive NEW).

On MCoder 2, REM #n, gives a choice of the mode in which the compiled program will run:

Mode 0	Gives the fastest code disabling the BREAK key.
Mode 1	Gives longer and slower code by enabling the BREAK key.
Mode 2	Gives code that runs at almost the same speed as BASIC, with TRACE on.

By default, Mode 1 is chosen.

Both compilers have good error messages, if a bit concise at times. Only MCoder 2 gives you the number of bytes which your code takes up, after compilation. It seems that the only way to save a compiled program is to save the whole of memory, machine code, compiler, work space, the lot. However, this is not difficult, and, with a microdrive, hardly time consuming.

One important point to note is that Super C allows only A to Z as variable names, giving only 26 available, without POKEing into memory. MCoder 2 on the other hand, happily accepts, 'LIVES' 'HS' and 'SCORE' without question. Both compilers are called with simple RAND USR commands.

Finally, to documentation, MCoder 2 was supplied by return of post in a cassette case with an inlay-card size, eight sides of "manual". This, however, tells you enough to make full use of the compiler, including a full description of all the commands available.

Super C took more than three weeks to arrive, and was sent in a large package, about the size of a video cassette box. Super C's manual can only be described as a work of art. Written by Tim Langdell, it gives a superb description of everything about the compiler including the commands, the error reports and just about everything else, finishing off with a plug for the rest of their programs.

If I had to choose between these two very powerful packages, I would prefer to use MCoder 2 from PSS, mainly because it can handle strings and can use more than 26 variables. It is also a little easier to use. However, since about June, Softek have been promising an enchancement package for Super C allowing for string arrays, string splicing and floating point. This will probably push up the price to around £15.00. Whether this will ever become available, we shall have to wait and see. At the moment, MCoder 2 still represents the best value for money.

For further information on the cassettes reviewed in this article you can write to the following addresses:

Silversoft Ltd, London House, 271/273 King Street, London W6.

New Generation Software, Freepost, Oldham Common, Bristol BS15 6BR.

Red Shift, 12c Manor Road, London N16.

Artic Computing, Main Street, Brandesburton, Driffield YO25 8RG.

Automata UK Ltd, 65 Osborne Road, Portsmouth, Hampshire PO5 3LR.

Abacus Programs, 716 Llangyselach, Treboeth, Swansea SA5 9E1.

Bug Byte, Mulberry House, Canning Place, Liverpool L1 8JB.

Softek Software, 329 Croxted Road, London SE24.

PSS, 452 Stoney Stanton Road, Coventry CV6 5DG.

The authors of any of the reviews published within this section of the magazine will receive payment equal to the amount spent on the software reviewed unless another financial arrangement has already been settled on. All contributions should be typed, double spaced and accompanied by screen dumps where possible. Your reviews should be sent to the following address:

Readers' Reviews
ZX Computing
1 Golden Square
London W1R 3AB.

Down to business

Or how to make your computer earn its keep.



The DK'Tronics keyboard.

Being determined to improve the quality of our listing print, I bought a Shinwa CP80 Centronics printer to do just that. Now armed with the ability to produce typewritten text easily, I wondered about using it and a computer as a word processor. At first I thought "get a **C", but then I started wondering whether the Spectrum could cope with the job.

My next step was to scan the magazines and write to the companies who were producing suitable goods — this is the outcome of the somewhat ambitious project.

The hardware

With the printer, bought due to availability rather than choice, I was limited to using a Centronics interface and Tasman. Kempston sent a suitable interface for me to try and I received a tape and letter from Microdot Software saying that Cobra Technology had sent a interface. Unfortunately the interface never arrived.

Memotech supplied an interface and Hi-res graphics pack for the ZX81 and finally, DK'Tronics supplied a keyboard. Fuller also offered one but at the time they were having problems — their keyboard finally appeared at the December ZX Microfair.

The keyboard

The DK'Tronics keyboard is a sturdy, solid-looking, black ABS case with a set of grey alphanumeric keys on the left and a 3x4 red numeric keypad set on the right. The Spectrum is removed from its case by unscrewing the case halves, gently pulling out the two keyboard connecting ribbon cables and unscrewing the two small circuit board screws. The reverse process is then undertaken with the DK'Tronics keyboard. Precise instructions are supplied so any incompetent can do it — even I managed!

The keys have a pleasant feel to them, the spring pressure was just about right to allow for my fumbling efforts, and generally the legends, supplied on transparent stick-on lables, are easy to read. Some of the smaller red characters — $%& — may give rise to eyestrain.

My main problem came from the design of the back of the case. The sides slope out slightly but the back slopes out a lot making it difficult, sometimes nigh impossible, to connect units to the user port. I had to take saw to case to remove several cms from between the port and the save/load sockets. Even so, some units that had ridges which normally fit over the top of the Spectrum would not fit without major surgery. The only way to use items such as the Microdrive or the Prism VTX modem which normally fit beneath the Spectrum, was to buy a ribbon cable extension.

Irritating though these problems are, the keyboard is still worth having for general use and is invaluable for any serious typing on the computer.

Interfaces

It would probably have been much better if I had asked Peter Shaw to take them apart and given us his expert opinion. However, here is the opinion of a electronically ignorant user!

Both the Tasman and the Kempston interfaces for the Spectrum are well boxed in tidy-looking, robust, black cases with firmly fitting edge connectors. Both are also "dead enders" as neither have sockets at the back for further units to be plugged in. If you use several such units then constant changing is called for with the eventual loosening of the connectors. The Kempston unit is slightly longer than the Tasman and has a slight ridge at the top which normally fits over the top of the Spectrum case.

Both units performed perfectly when LLISTing, LPRINTing and making screen



The Tasman interface.

text copies. The Tasman offered options to print alternative characters for UDGs and the block character set — usually it prints the "natural" letter (ABC. . .etc) for the UDGs and sets the graphics to printer codes. If your printer has a graphic set then it is possible to alter these codes so that it will print the graphics.

The Kempston interface simply substitutes spaces where it encounters UDGs or graphics codes. This was a problem but I wrote a simple routine to replace UDGs with ABC. . in the listing before printing. I include this as Fig 1.

Making screen dumps is a feature of the Sinclair printer which is very useful: however, I could not get the Tasman to produce one at all. I tried both BASIC and various of the m/c routines supplied but to no avail although I'm assured that they work with Epsoms, Seikoshas, Star and Tandy printers.

The documentation for the Tasman was superb and very easy to use, but when sending control codes to the printer — to print different line lengths for instance — you have to send an extra code CHR$ 27 before each non-standard ASCII code.

Although the Kempston instructions are less professional in appearance, they are, nevertheless, clear and easy to use. The user has to make any adjustments via BASIC POKES and not through program control as with the Tasman, and printer control codes are sent by the more usual system of CHR$ (27) — the brackets indicating a control code.

Then came the test. I loaded the Epson screen dump code which Kempston said would work with the Shinwa, typed the RANDOMISE USR number and hey presto! One hi-res screen dump.

There is very little to choose between the two interfaces; the Kempston seems to have a little more support from other software houses, but the reason that I'm using it is purely because of the screen dump facility. To produce listings for *ZX Computing* I'm using the Tasman interface, mainly because it fits better with the keyboard.

The Memotech Centronics interface for the ZX81 is one of their series of interconnecting units that are as wide as the ZX and comes cased in an attractive black metal box. This is supplied with an instruction booklet which I found needed careful study. Although straightforward in printing letters, there are a few awkward actions needed when sending control codes. So far I have not been able to manage to LLIST the graphic characters, but Memotech also kindly sent their Hi-res Graphics unit from which it is possible to COPY a screen. The problem now is how to send the program list to the Hi-res screen and then COPY it.

Owing to the fact that there is no related software to adjust, this is not easy. If any readers have solved the problem I'd love to hear from them! Meanwhile, I will continue to print the ZX81 listings in the complex but, I hope, easily read format found herein.

Fig.1 Machine code routine to search and replace all UDGs with the letters A to U.

```
 10 CLEAR USR "a"-61: LET a=USR
 "a"-60: PRINT "Code located at
address ";a''"Use by  RANDOMIZE
USR ";a
 20 FOR i=a TO a+55: READ a$: P
OKE i,((CODE a$(1)-48-(7 AND a$(
1)>"@"))*16+(CODE a$(2)-48-(7 A
ND a$(2)>"@")): NEXT i
100 DATA "ED","4B","4B","5C","2
A","53","5C","18","17","7E","FE"
,"0E","28","10","FE","0D","28","
0D","FE","22","28","0F","23","A7
","ED","42","D0","09","18","EB"
110 DATA "23","23","23","23","2
3","18","F1","23","7E","FE","22"
,"28","EB","D6","90","38","F6","
D6","15","30","F2","C6","56","77
","18","ED"
```



Fig.2 One hi-res screen dump produced using the Kempston interface (courtesy of Ultimate).

The software

Now that I had the computer housed with a high quality keyboard and on speaking terms with the printer, I turned my attention to finding some form of Wordprocessor. I am a single finger typist at best, and find that my paper usually has more tippex on it than ink but to get someone else to type up my work is a costly process.

I have tentatively used one of the "B" Wordprocessors and so realised that this would be the answer, but would a suitable professional machine be available for the Spectrum?

Two companies sent samples of their products; Tasman and Microl, both for the 48K Spectrum, but before looking at them let me explain briefly what a wordprocessor (wp) should do, and what I wanted it to do. Skip this next section if you already know!

Wordprocessing

A wp effectively turns your computer into a typewriter and displays text on the screen. This can then be altered, modified, adjusted, corrected, added to or removed before being sent to a printer.

Text can be formatted or laid out on screen by use of various commands "embedded" in the lines and can be Loaded/Saved or Merged. A range of text-handling commands are usually provided to move blocks of text and a system of sending codes to operate the printer is desirable. This is an outline of the basic requirements, if you are looking for a professional, specialist wp then many other facilities will be required, consult an expert!

1 The Microl: Supplied in a presentation-type box with a well produced booklet, the Microl wp follows the standard system of embedding formatting controls within the text.

There is room for 30,000 characters, approximately 4000 words, which is roughly equal to ten A4 pages. This is made up of 950 lines of 32 characters and is a lot of text. This article, for instance is 400 lines long.

The booklet is quite a good manual although it depends on your attitude to learning. If you like things spelt out in simple words, phrases like "feel free to experiment" will fill you with terror! All the available commands are explained briefly but adequately, there are 21 file handling commands and 12 embedded formatting commands. Saving, loading and merging facilities are provided.

One of the most useful features of a wp is Word Wrap — a system where a word which would be split by the end if a line is transferred complete to the next line. This facility is included in the Microl program. Using this program was fairly easy. I had to work with the manual in easy reach, but I soon found myself remembering the most frequently used commands. Text is displayed in the usual 32 chr/line form and can be sent to the Sinclair printer or to a printer with a greater number of characters to a line.

A fair amount of time is spent in the manual in formatting using the ZX printer and only 14 lines on using a bigger beast. I think this is a little unwise as I would imagine that anyone likely to invest in a wp would probably intend using a quality printer. There is also a lack of facilities to output printer control codes, and to use anything other than the ZX printer you have to modify the BASIC program yourself. This could and should have been done as part of the program run.

I found editing to be a bit

fiddly and the system of entering lines separately to the main text display (just as you enter new lines in a BASIC program) difficult to get used to.

As a general comment, this is a good wp but is probably most suited to the home user with a ZX printer who wishes to produce well set out text. Ideal for writing your Christmas thank you letters!

2 The Tasword Two: This is the most professional, user friendly business-type program for the home micro that I've ever seen. Everything from the manual (written using Tasword) to the on screen presentation is designed to enable the user to feel relaxed and confident when using the program.

On loading, the program is "write" mode and displays an empty screen except for the cursor in the top right corner and a status line at the bottom of the screen. This status line shows a constantly updated line and column cursor position and the state of the justify, word wrap and insert modes.

The text is displayed as written and this is cleverly produced with 64 characters to a line. An option is available to display at the normal 32 characters if you find the letters too cramped. I soon became used to the 64 format and I have never needed to use this option.

The booklet is very well written and takes the user through each command step by step, and if that's not enough, there is a tutor program supplied on the tape to give you practical examples and experience. Should you get stuck, two "help" pages can be accessed during the programs operation which lists all 42 commands and the 8 printer control codes. A further page can be called which is a menu for Print/Save/Load/Merge/Define your own printer codes/Return to file or BASIC options.

This program was written with the professional printer in mind but also will print on the ZX printer at 64 characters per line which is readable but not very satisfactory. Comprehensive instructions are given to allow you to use the program with a variety of different printers and interfaces.

There is not enough room to list all the functions which this program provides — suffice to say that everything I needed was provided as well as many options which I haven't got a use for as yet.

To sum up, this is the one for me and in fact, the whole of the magazine was written with the aid of Tasword Two! I think that this program will provide word processing for anyône who needs this facility (bar specialist applicaions) and, taking into account the cost of a keyboard and interface, still works out cheaper than its nearest rival.

Tasman software also supply a program which will convert your normal Spectrum display to the 64 character one used in the word processing package.

Conclusion

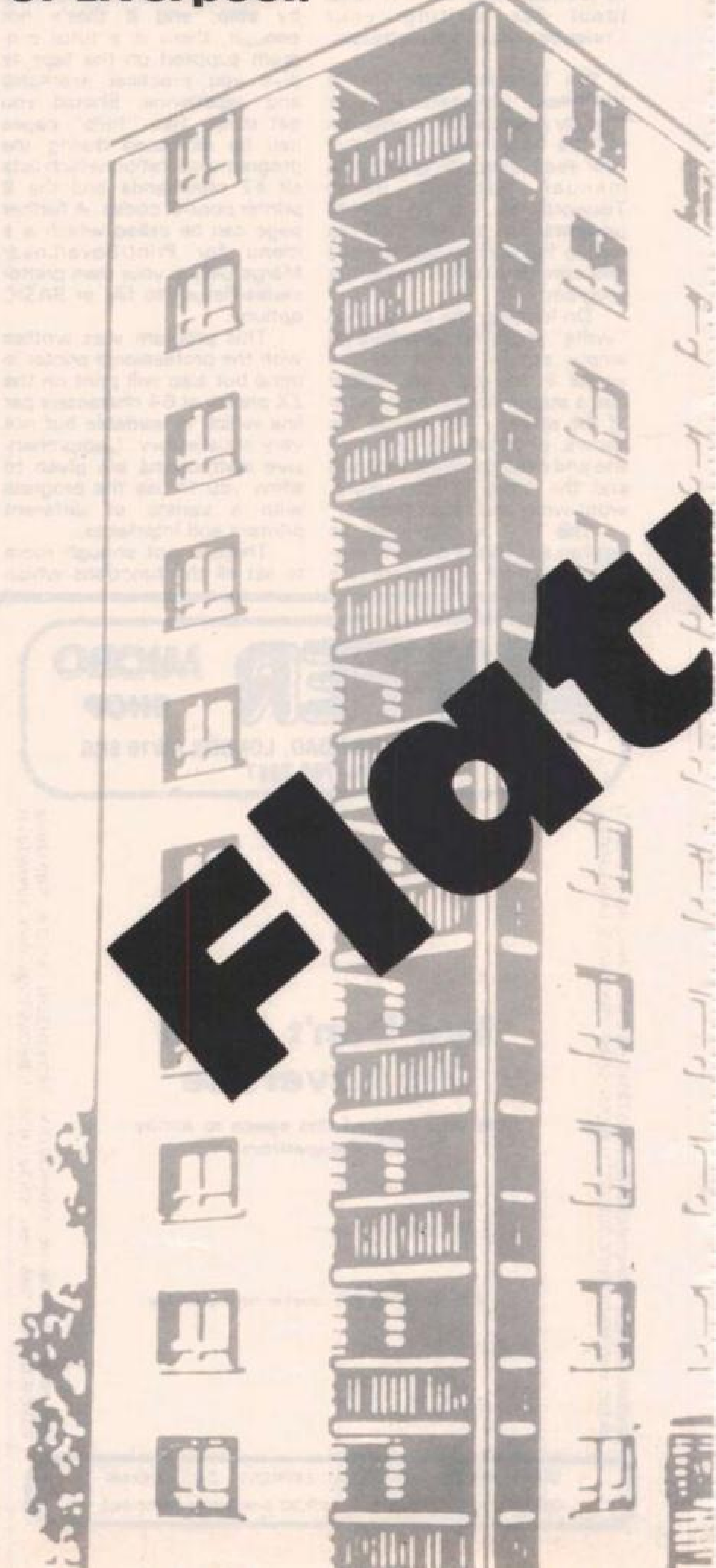
Well, apart from producing the ZX81 graphic set, I think that I have achieved all that I set out to do. I'll work on the latter and perhaps investigate the possibility of using the Spectrum to store records of our contributors and the software file lists that we sometimes publish.

I've already had a quick look at Sinclair's VU FILE, if only I could get it to print on the Shinwa at 80 cp — I'll let you know . . .

Further information on the items mentioned above can be obtained from the following addresses:

Keyboard:
DK'Tronics Ltd, Unit 6, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AQ price £45.00.
Interfaces:
Kempston Micro Electronics Ltd, Unit 30, Singer Way, Woburn Road Industrial Estate, Bedford MK42 7AF price £45.00.
Tasman Software, Dept ZXC, 17 Hartley Crescent, Leeds LS6 2LL price £45.00.
Memotech Ltd, Station Lane, Witney, Oxon OX8 6BX (ZX 81 Centronics Interface and Hi-res unit) price £24.95 and £29.95.
Word processors:
Microl, 1 Milton Road, Cambridge CB4 1UY price £9.95.
Tasman Software, Dept ZXC, 17 Hartley Crescent, Leeds LS6 2LL price £13.90.

There's been Zip, Zap and Pac-man, now here's Flatman, a race against grime by J Dave Rogers of Liverpool!



In this game you play the part of the harrassed caretaker of a rather badly situated block of flats. Your job is to ensure that every window gets cleaned when dirty and repaired when cracked, using the buckets of water and spare panes of glass that are stored around the building. The difficulties, however, are that you cannot carry both water and glass at the same time, and that the windows keep getting dirtied again (pollution and pigeons!) and cracked again (aircraft vibrations and vandals). If you manage to get the whole lot perfect (and don't fall off too many times in the process) you can go on to harder levels of the game, the object being to reach as high a level as possible.

How to play

Use keys Z and C to move left/right, keys N and J to move up down. You must travel along the ladders and walkways marked by inverse 'equals' signs, if you try to do otherwise you will fall off and lose a life. To pick up water move towards a 'w', or for glass go towards a 'stroke', the man will then flash with whatever has been picked up. When you are 'empty' the man flashes white. Each 'w' you pick up lets you clean four windows, and similarly each pane of glass lets you fix four windows. You can pick up as many as you like at one time but you cannot carry glass and water together (too dangerous!) so if you already have water and then go to pick up glass you will lose whatever water you had left, and vice versa. Tactics are clearly needed to make the most of what there is.

To clean or repair a window just move towards it from either side or from underneath, using the same movement keys as usual. Whenever you manage to get all the windows clean together you are moved on to harder levels of the game, where the ladder-pattern is more awkward and there is less water available.

Program operation

Lines 20-70 are the man-move subroutine. Since this is by far the most frequently used part of the program, it has been placed right at the beginning of the listing, and the variables used in it are defined before any others when the program is first run, this making all access times as short as possible. These considerations together with poking onto the screen rather than 'PRINT AT' make for a fast game compared to many ZX81/BASIC written programs.

Line 40 checks for move/can't move/fall off/pick up water/glass/clean window/repair window. It does this by looking at the *next* space to be moved to and if this is not a 'ladder' (character 148) then the program is diverted to lines 300-580 where, depending on what character is found, different actions are taken. Eventually a return command is hit which completes the original GOSUB to the man-move subroutine. The man's previous known screen position is still held unchanged in the variable PP so that normal movement can resume next time around.

Lines 100 and 110 form a loop which constantly calls the man-move subroutine, but the loop is occasionally broken out of to allow the next set of lines to operate as follows: lines 200-290 cause windows to be cracked or dirtied again during the game. So as not to slow down movement during this operation, the man-move subroutine is also called in between lines.

Line 310 uses Boolean algebra to replace a long mess of IF-THEN-GOTO comparison lines. Assume for example, that line 310 has found a 'dirty window' (grey character, code 8) *and* that the man has 'water' (w>0) then line 500 is selected. This reduces water points by one, then in line 540 the grey is POKEd with a space character to 'clean' it. Line 550 then looks to see if the next space is also a grey, if so POKEing it, if not POKEing the space before it. This is so that any window can be wiped from either side or even underneath and still give the same result. A similar procedure is followed for repairing cracked windows.

Lines 600-690 initialise variables. Lines 700-892 form a subroutine to draw the screen, also used to redraw it full of broken windows at each new level of the game. Line 705 starts the ZX81s random number sequence off at a fixed place for each level of the game. Each screen therefore follows a different pattern of window cracking, but it is always the same for a given level. This is done so that players can eventually learn what to expect and develop tactics.

Line 830 causes the ladder pattern to vary between levels. Lines 900-990. The 'fall off' routine. This replaces characters behind the man as he falls.

Modifications

Onscreen instructions have been omitted to keep program length down, but readers may like to add their lines at the end of the program to do this. A few sarcastic comments might also be added at the end, depending what level the player managed to reach.

If you find the game too difficult then change line 800 to print 32 graphic 'equals' instead of blacks, thereby giving the man extra access all along the bottom. If the game seems too easy however, try *slightly* decreasing the value of 0.94 in line 110 as this determines how often windows are likely to be re-cracked during play.



Variables

PP	Present position of man.
S	Next intended screen position.
X	Marks the start of the screen in the display file.
K	Character of man.
Y	Character of next space if user tries to move off a ladder. This is used to decide whether man picks up water, picks up glass, cleans window, repairs window or just falls off.
W	Water points.
GL	Glass points.
PW	Perfect windows (0 to 30).
E,F,H	Used to generate random cracking/dirtying of windows.
LE	Level of game.
N	FOR-NEXT loops.
P$	Printing string, used to print horizontal walkways.
LIFE,L$	Number of lives left; on screen indication of this.
JD	At the end of line 990 is just an undefined variable to stop the program at the end of the game.

A note or two

Graphics 'equals' are important characters in this program, but these can often look like inverse spaces when printed on paper, so please note the following very carefully when typing-in:

Line 730 : 14 graphic shift F; 3 spaces, 3 graphic shift F.
Line 740 : 3 graphic spaces, eight various characters, 5 graphics spaces, 2 spaces, 3 graphic 'equals'.
Line 760 : Graphic shift 'S' is used.
Lines 760, 770 and 780 must have graphic 'equals' at positions 4,7,10,13,19 and 21.
Line 810 : 6 graphic 'equals'.
Line 830 : 2 graphic spaces, 3 graphic 'equals'.
Line 880 W, graphic 'equals', W.

Since the program contains 'pokes' it is liable to crash if typed in wrongly, so it is a good idea at first to omit the self-start line 1050 and 'save' a few copies of the progrom onto a cassette *before* it is ever run.

Warning

This listing was not printed on a Sinclair printer and graphic characters have been replaced by a simple code. This consists of a number (no number means only one character) which is the number of characters needed, followed by "g" to indicate graphics mode, and finally a letter or number which is the key of the character. The code "is" means inverse space, ie "■".

These codes are combined with a "+" as a separator, so the code "2is+2ga" means two inverse spaces and two characters obtained by graphics mode shift/key A. Lower case messages are to be typed in inverse mode.

I hope you will find this easy to enter, I know it is less than simple, but I think that you will agree with me that it makes the rest of the program easier to read . . .

```
   1 REM J.DAVE.ROGERS,WALTON,83
   5 GOTO 600
  10 REM main loops'
  20 POKE PP,148
  30 LET S=PP+(INKEY$="C")-(INKE
Y$="Z")+(33 AND INKEY$="N")-(33
AND INKEY$="J")
  40 IF PEEK S<>148 THEN GOTO 30
0
  50 LET PP=S
```

```
  60 POKE S,K
  70 RETURN
 100 GOSUB 20
 110 IF RND<.94 THEN GOTO 100
 200 LET E=5+INT (RND*6)*3
 210 GOSUB 20
 220 LET F=7+INT (RND*5)*3
 230 GOSUB 20
 240 IF RND>.8 THEN LET H=8+(53
AND H=8)
 250 GOSUB 20
 260 IF PEEK (X+E*33+F+1)=90 THE
N LET PW=PW-1
 270 GOSUB 20
 280 PRINT AT E,F;CHR$ H+CHR$ H
 290 GOTO 100
 299 REM subroutines'
 300 LET Y=PEEK S
 310 GOTO 320+(80 AND Y=60)+(110
 AND Y=24)+(180 AND Y=8 AND W>0)
 +(200 AND Y=61 AND GL>0)
 320 IF Y=0 OR Y=128 AND S-X<660
 THEN GOSUB 900
 330 RETURN
 400 LET W=W+4
 410 LET GL=0
 420 GOTO 450
 430 LET GL=GL+4
 440 LET W=0
 450 POKE S,90
 460 LET K=Y
 470 RETURN
 500 LET W=W-1
 510 GOTO 530
 520 LET GL=GL-1
 530 IF W=0 AND GL=0 THEN LET K=
0
 540 POKE S,90
 550 POKE (S+1-(2 AND PEEK (S-1)
=Y)),90
 560 LET PW=PW+1
 570 IF PW=30 THEN GOSUB 700
 580 RETURN
 599 REM initialise
 600 LET X=PEEK 16396+256*PEEK 1
6397
 610 LET S=X+498
 620 LET PP=S
 630 LET K=23
 640 LET Y=1
 650 LET W=0
 660 LET GL=0
 670 LET H=8
 680 LET LE=0
 681 POKE 16418,0
 682 LET g$="32gh"
 683 LET LIFE=4
 684 LET L$=" ***"
 685 GOSUB 700
 690 GOTO 100
 699 REM set up next screen
 700 LET LE=LE+1
 705 RAND LE*333
 710 LET PW=0
 720 PRINT AT 1,8;"12g6"
 730 PRINT TAB 7;"14gf+3S+3gf"
 740 PRINT TAB 6;"3is+gl+/+is+gl
+W+is+gl+/+5is+2S+3gl"
 750 FOR N=1 TO 6
 760 PRINT TAB 6;"is+2gs+gl+2gs+
gl+2gs+gl+2gs+gl+2gs+is+2S+gl+/+
gl+W"
 770 PRINT TAB 6;"is+XX+gl+XX+gl
+XX+gl+XX+gl+XX+is+1S+W+gl+gq+gl
+gq"
 780 PRINT TAB 6;"3is+gl+3is+gl+
2is+gl+2is+gl+3is+1S+gw+gl+/+gl"
 790 NEXT N
 800 PRINT AT 21,0;"32is"+G$+G$
 810 LET P$="6gl"
 820 PRINT AT 6,13;P$;AT 9,7;P$;
AT 18,15;P$;AT 12,15;P$+P$( TO 4
);AT 15,3;P$+P$
 830 IF LE<7 THEN PRINT AT 21-LE
*3,10;P$+"2is+3gl"+P$
 840 FOR N=0 TO 20
 850 PRINT AT 0,N;" W  W"
 860 PRINT AT 5+INT (RND*6)*3,7+
INT (RND*5)*3;CHR$ 8+CHR$ 8
 870 PRINT AT 0,N;" M  M"
 880 IF N>14+LE THEN PRINT AT N,
2;"W+gl+W"
 890 NEXT N
 891 PRINT AT 0,0;"level
          life";AT 2,1;LE
 892 GOTO 970
 899 REM fall off routine
 900 POKE S,Y
 910 LET S=S+33
 920 LET Y=PEEK S
 930 POKE S,23
 940 IF S-X<725 THEN GOTO 900
 950 LET PP=X+499
 960 LET LIFE=LIFE-1
 970 PRINT AT 2,28;L$( TO LIFE)+
"  "
 980 IF LIFE>0 THEN RETURN
 990 PRINT AT 0,9;"GAME OVER";JD
1000 SAVE "FLATMAN"
1010 PRINT AT 3,7;"flatman LOADE
D",,,"STOP THE TAPE THEN PRESS A
NY KEY",,"MOVEMENT KEYS ARE Z,C,
N AND J."
1020 PRINT AT 3,7;"
 "
1030 IF INKEY$="" THEN GOTO 1010
1040 CLS
1050 RUN
```

Datafile

A multi-purpose file handling program from Nigel Salt in Kent.



Keeping records can be a laborious job — bits of paper alterations, amendments etc etc. But now in this comprehensive and versatile program you have all the facilities that most filing applications will require.

Datafile impressed us in both operation and in programming techniques, it is liberally REMmed so that the operation of each section is explained and has been well documented by Nigel for the operator to use.

Whatever your interest, job, or need, Datafile will be of use. Type it in and then read the following instructions on using it.

Datafile is a utility program which sets up a file in A$ in accordance with parameters supplied by the user. The only limit to the number of records held is the size of the memory of your Spectrum. A 16K machine can only manage 28 records 100 characters long but fields within each record can be any length and each field can be given a name up to 6 characters long.

Toolkit is a set of subroutines designed to enable you to use files generated by Datafile in your own programs. The sample application program Letters (on side 2 of your cassette) gives an example of one such application.

The uses of these routines is manifold. You might use them to set up a directory of your records and tapes or books. You could equally use Datafile to keep track of all your business clients. The example which follows guides you through every stage of datafile and explains the use of Toolkit routines.

Using the program

On using the LOAD "" command and playing side 1 of your tape you will be greeted with the main menu. Before you can use a file it must be defined in the following ways:

1. Select option from the menu. The program first asks you to name your file. You can call it anything you like but for this example enter CLIENT.
2. Number of records. Once you have named your file the program asks you how many records will be on this file. It is always a good idea to specify more than you think will be required to allow for future growth.

For this example enter 10. This will mean that only 9 clients can appear on the file because Datafile uses the first record to store information about the file size and structure.

3. Record size. Each record can be any size you wish. Obviously it must be equal to or greater than the maximum number of characters of data that you wish to store on each record. For the example enter 120.
4. Number of fields. What you enter here requires some thought. It is necessary to define one field for every item of data which you want to hold on each client. The difficult part may be deciding what constitutes an "item of data".

Say you wanted to store the address of each client. You could specify just one field called say, ADDRESS. This would not be very useful because then you would be unable to access individual lines of the address. A better solution would be to define one field for each line of the address and call them something like ADLIN1, ADLIN2 etc to refer to address line 1 and so on. For this example enter 10.

5. Field definition. If you have followed the example instructions then the program will now tell you that the CLIENT file has 10 records of 120 characters each.

The program will then ask for a name and size for each field in turn. You can call the fields anything you like but any name more than 6 characters long will cut short automatically. I recommend that you give meaningful names to your fields to make future use of your files easier. There is no restriction on the length which you specify for each field providing that the sum of the field lengths is less than the record length which you entered at 3 (record size) above. For the example I suggest that you enter the following field names and lengths:

Name of field	Length of field
INITS	6
NAME	15
ADLIN1	20
ADLIN2	15
ADLIN3	15
ADLIN4	10
PHONE	15
ACCNO	6
INVDAT	8
INVNO	6
	116

The total length of these fields is 116 characters which is less than the 120 character size which we entered at 3 above. When you have entered the data above you will have defined all of the 10 fields which you specified for each client record at 4 above. You will now be returned to the main menu.

Entering data

First select option 2 from the menu. If you have been following the example then you will be asked for the value of INITS in this record. For reasons which will become plain when you use LETTERS, enter your own initials separated by full stops. Your entry will now be displayed next to the field name. If you have made a mistake don't worry, you will be given an opportunity to put it right when you have entered all the data for this record. Continue to enter your details as prompted. If you just press "ENTER" when asked for a value then that field will not be left empty. Clearly you will not have an account number and you will not have invoices outstanding yourself. Thus for these fields leave a blank. If you later sort the file by invoice date for instance then records with no invoice data will be put at the front of the file.

Having entered your own details you will be asked whether you wish to alter anything. If you enter "Y" then you will be prompted to enter a new value for each field in turn. If you just press "ENTER" when prompted then the value for that field will be left unchanged. When you are happy with the record content, press "ENTER" when asked if you want to alter anything and you will be asked whether you wish to enter any more records. If you enter "Y" then the process above will begin again. If you just press "ENTER" then you will be returned to the main menu.

When you enter dates I suggest that you use the American format: YY/MM/DD rather than the British format: DD/MM/YY. If you do this then you will be able to sort your records by date using the sort routine in Datafile. You might wish to sort clients into Date of Birth order for example.

Sorting files

Select option "3" from the main menu. Assuming that you have more than one record on your file you can now sort them alphabetically or numerically.

The sort routine will first ask you for the name of the files by which you want to sort your records. For example, if you want to sort your file so that the records appear in alphabetical order of names then you might enter NAME.

If the field name that you have entered was a valid one then the message "SORTING" will appear on your screen. When sorting is complete you will be returned to the main menu. If you have entered the name of a field which does not exist then you will be asked to enter another. If you have forgotten the names you assigned to the fields of your record don't panic. Just press "ENTER" and you will be returned to the main menu. You can now select option "8" which will tell you the names that you gave (see print file detail).

Amending/deleting records

Select option "4" from the menu. You will be asked for the name of a field. Say you know that the record which you wish to amend is that of Mr West. This means that the name WEST will be in the NAME field of that record. You should thus enter NAME when asked for a field and WEST when asked for a value for that field.

If you enter a field name which you have not defined then you will be asked to try another. Just pressing "ENTER" at this point will return you to the menu. If the value of the field does not exist on the file then a message will be displayed to this effect. For example, if you had not entered a record for Mr West when entering data.

Once the record that you require has been found you will be given the opportunity to alter each field in turn. If you do not wish to amend a particular field then just press "ENTER" when prompted for a new value.

To delete a record select option "5" from the menu. As when amending records, you will be asked for the information that the program requires to find the record that you wish to delete. When the record has been found it will be removed from the file and you will be returned to the main menu.

Saving and loading

Once you have got some data on your file you may want to save the file to tape. To do this select option "6" from the menu. The file will now be saved under the name by which it was defined above. If you followed the example your file will be saved as "CLIENT" DATA A$ ().

When the file has been saved you will be prompted to rewind the tape and prepare for verification. You will be returned to the main menu when verification is completed. If verification fails, use "GO TO 1" to return to the menu and then try again.

If you wish to update files which you have already saved to tape then select option "7" from the menu. You will be asked for the name of the file. If you have forgotten it then just press "ENTER". The program will then load the first file that it comes to on tape.

When the program has loaded your file it will decode the first record to determine the format of your file and the names which you gave to its field. It will then return to the menu. You can find out the names of the fields etc by selecting option "8".

Print file detail

Select option "8" from the menu. The program will then print the names of each of the fields in the file and tell you the position that they occupy in each record.

For example if field INITS starts at 1 and ends at 6 then this tells you that INITS occupies the first 6 characters of each record, ie for record 2 inits would be A$, (2, 1 TO 6).

To print the whole file select option "9" from the menu. Each record on the file will be displayed in turn.

Warning!

If you BREAK out of the program for any reason use "GO TO 1" to return to the menu. *Do not use* "RUN" since this will result in the loss of any data held on the current file.

A list of the variables used by Datafile is given in REM statements at the start of the program. You *must not* use these variables in your own programs when you use Toolkit to manipulate data held on files created by Datafile.

Using Toolkit

Each of the routines in TOOLKIT is designed to make using Datafile files in your program easy. Each routine is fully documented in REM statements.

1. Get field value. Each record in a Datafile file is stored as an element of the array A$. For example, the first record in the file will be A$(2). You will remember from the field definition stage that each field within a record also has a number and a name. The field number enables Toolkit to find out the position of a field in each record. It might, for instance, be A$(2,1 TO 6) as for INITS in the example. This routine when supplied with a record number in RN and a field number in FN will fetch the value of that field in record number RN. The value is returned in Q$ and trailing spaces are automatically removed.

2. Decoding dates. I have already explained the usefulness of storing dates in the American format. This routine will translate a date supplied in Q$ from the American form to the British form.

3. Removing spaces. If you have given a field in a record a value with less characters than the field length then the field will contain spaces after your value. This routine removes the unwanted spaces from a field value supplied in Q$ and returns the trimmed value in Q$.

4. Read header. I explained above that the first record on a Datafile file contains information required by Toolkit to use the data in your file. When you use the LOAD routine this routine is automatically called to find out the format of your file.

5. Loading files. This routine will load a Datafile file and call the header reading routine. The name of the file should be in Q$ on entry to the routine. If you don't know the name than let Q$ = "".

6. Find field number. The name of the field required should be in Q$ on entry to the routine. The routine will then find out the number of that field and return the result in FN. The value of FN allows you to get the start and end positions of that field from the numeric array F() which will have been filled by the header read routine. F (FN,1) holds the start position and F(FN,2) the end position. Thus, field 1 of record 1 extends from A$ (1,F(1,1) to A$(1,F(1,2)).

7. Finding a record number. This routine returns in RN the number of the record which has a value equal to that of Q$ in the field designated by FN. You should define Q$ and FN ▶

before entry to the routine. The record number is returned by the routine in RN.

Letters: a sample application

If you followed the example that I have given you will now have a file called CLIENT. LETTERS will input this file from tape and then write a letter to each client reminding them of the account that they have outstanding. Now you know why your own details should be entered first!

The listing of LETTERS should help you to develop your own applications. I hope that Datafile meets all your requirements.

Listing 1: Datafile

```
    4 REM ********************
          *   DATAFILE       *
          *VARIABLES:-       *
          *N$=NAME OF FILE   *
          *A$(1)=DUMMY RECORD *
          *NR=NUMBER OF RECS  *
          *SR=RECORD SIZE     *
          *NF=NUMBER OF FIELDS*
          *F$(I)=NAME OF FIELD*
          *F(I,1)=START FIELD *
          *F(I,2)=END   FIELD *
          *NRU=NO. RECS USED  *

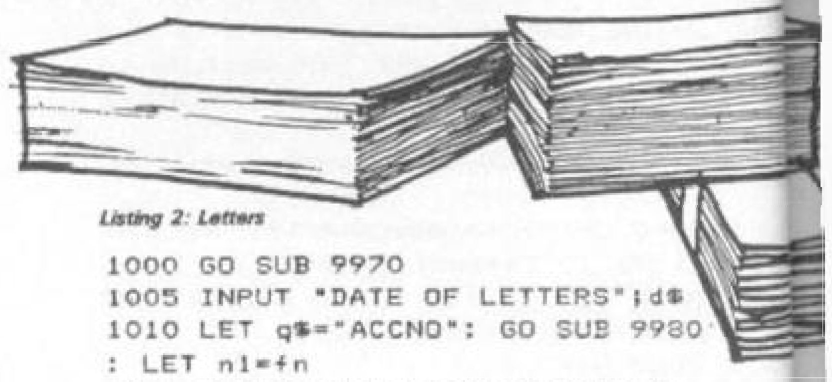
    5 REM *FN=NO. OF FIELD    *
          *   FOUND BY SEARCH *
          *   ROUTINE         *
          *RN=NO. OF RECORD   *
          *   FOUND BY SEARCH *
          *   ROUTINE         *
          ********************
   98 CLS
  100 REM ********************
          *   SETS CAPS LOCK  *
          ********************

  101 IF  INT ( PEEK 23658/8)=2*
INT ( INT ( PEEK 23658/8)/2) THE
N  POKE 23658, PEEK 23658+8
  110 CLS : PRINT  AT 0,8; INVERS
E 1:"DATAFILE MENU"
  120 PRINT '"(1) DEFINE FILE"''"
(2) ENTER DATA"''"(3) SORT FILE"
''"(4) ALTER RECORD"''"(5) DELET
E RECORD"''"(6) SAVE FILE";
  121 PRINT ''"(7) LOAD FILE"''"(
8) PRINT FILE DETAIL"''"(9) PRIN
T WHOLE FILE"''"(0) EXIT FROM PR
OGRAM"
  130 PRINT  AT 21,0; INVERSE 1;"
ENTER NO. OF OPTION REQD": INPUT
  LINE Q$
  140 IF Q$="1" THEN  GO SUB 1000
  150 IF Q$="2" THEN  GO SUB 2500
  160 IF Q$="3" THEN  GO SUB 3500
  170 IF Q$="4" THEN  GO SUB 3700
  180 IF Q$="5" THEN  GO SUB 4000
  190 IF Q$="6" THEN  GO SUB 3000
  200 IF Q$="7" THEN  GO SUB 3100
  210 IF Q$="8" THEN  GO SUB 3200
  220 IF Q$="9" THEN  GO SUB 3300
  230 IF Q$="0" THEN  STOP
  300 GO TO 100
  999 REM ********************
          *HEADER    CREATE   *
          ********************
 1000 CLS : INPUT "NAME OF FILE:
";n$
 1010 INPUT "NUMBER OF RECORDS: "
;nr
 1020 INPUT "RECORD SIZE: ";sr
 1030 INPUT "NUMBER OF FIELDS: ";
nf
 1035 LET start=1: DIM f$(nf,6):
DIM f(nf,2)
 1036 CLS : PRINT "FILE NAME: ";n
$''nr;" RECORDS OF ";sr;" CHARAC
TERS"'';
 1040 FOR i=1 TO nf
 1050 PRINT ''"NAME OF FIELD ";i;
" "; FLASH 1;" "; CHR$ 8;: INPUT
 f$(i): PRINT f$(i)'
 1060 PRINT '"LENGTH OF FIELD ";i
;" "; FLASH 1;" "; CHR$ 8;: INPU
T sf: PRINT sf
 1070 LET f(i,1)=start: LET start
=start+sf-1: LET f(i,2)=start: L
ET start=start+1
 1080 NEXT i
 1085 IF sr<nf*12+14 THEN  LET sr
=nf*12+14
 1086 LET nru=1
 1090 DIM a$(nr+1,sr)
 1099 REM ********************
          *WRITE HEADER       *
          ********************
 1100 LET a$(1,1)="9": LET a$(1,2
 TO 4)= STR$ nr: LET a$(1,5 TO 7
)= STR$ sr: LET a$(1,8 TO 10)= S
TR$ nf
 1110 LET a$(1,11 TO 13)= STR$ nr
u
 1200 FOR i=0 TO (nf-1)*12 STEP 1
2
 1210 LET a$(1,14+i TO 14+i+5)=f$
(i/12+1)
 1220 LET a$(1,14+i+6 TO 14+i+8)=
 STR$ f(i/12+1,1)
 1230 LET a$(1,14+i+9 TO 14+i+11)
= STR$ f(i/12+1,2)
 1250 NEXT i
 1260 RETURN
 1999 REM ********************
          *HEADER      READ   *
          ********************
 2000 CLS : LET nr= VAL a$(1,2 TO
 4): LET sr= VAL a$(1,5 TO 7): L
ET nf= VAL a$(1,8 TO 10): LET nr
```

```
u= VAL a$(1,11 TO 13)
2010 DIM f$(nf,6): DIM f(nf,2)
2020 FOR i=0 TO (nf-1)*12 STEP 1
2
2030 LET f$(i/12+1)=a$(1,14+i TO
 14+i+5)
2040 LET f(i/12+1,1)= VAL a$(1,1
4+i+6 TO 14+i+8)
2050 LET f(i/12+1,2)= VAL a$(1,1
4+i+9 TO 14+i+11)
2060 NEXT i
2070 RETURN
2499 REM ********************
        *DATA ENTRY  SUB    *
        ********************
2500 CLS : LET nru=nru+1: LET a$
(1,11 TO 13)= STR$ nru
2505 FOR i=1 TO nf
2510 PRINT  AT 2*i,0;f$(i);"  ";
a$(nru,f(i,1) TO f(i,2)); FLASH
1;" "; FLASH 0
2511 INPUT q$: IF q$ <> "" THEN
 LET a$(nru,f(i,1) TO f(i,2))=q$
2520 PRINT  AT 2*i,0;f$(i);"  ";
a$(nru,f(i,1) TO f(i,2));"     "
2530 PRINT
2540 NEXT i
2545 INPUT "ALTER ANYTHING(Y/N)"
;Q$: IF Q$="Y" THEN  GO TO 2505
2550 INPUT "ENTER MORE RECS (Y/N
)";q$: IF q$="y" OR q$="Y" THEN
 GO TO 2500
2600 LET a$(1,11 TO 13)= STR$ nr
u
2610 CLS : RETURN
2999 REM ********************
        *     SAVE FILE     *
        ********************
3000 CLS
3010 SAVE N$ DATA A$()
3020 PRINT #1;"PREPARE FOR VERIF
ICATION AND"''"THEN PRESS <ENTER>
": PAUSE 0: CLS
3030 VERIFY N$ DATA A$()
3040 RETURN
3099 REM ********************
        *     LOAD FILE     *
        ********************
3100 CLS : INPUT "FILE NAME";N$
3110 LOAD N$ DATA A$()
3120 GO SUB 2000
3150 RETURN
3199 REM ********************
        *PRINT FILE DETAILS *
        ********************
3200 CLS : INPUT "HARD COPY (Y/N
)";Q$
3201 IF Q$="Y" THEN  OPEN # 2,"P
"
3203 CLS : PRINT  INVERSE 1;"FIE
LD"; AT 0,10;"START"; AT 0,20;"E
ND"''
3205 FOR i=1 TO nf
3210 PRINT f$(i); TAB 10;f(i,1);
 TAB 20;f(i,2)
3220 PRINT
3230 NEXT i
3235 PRINT "NUMBER RECS USED =";
nru
3250 OPEN # 2,"S"
3251 PRINT #1;"PRESS ANY KEY TO
CONTINUE": PAUSE 0
3260 RETURN
3299 REM ********************
        *PRINT WHOLE FILE   *
        ********************
3300 CLS : INPUT "HARD COPY (Y/N
)";Q$: IF Q$="Y" THEN  OPEN # 2,
"P"
3310 FOR i=2 TO nru
3320 CLS
3325 PRINT  TAB 10; INVERSE 1;"R
ECORD NUMBER: ";I''
3330 FOR j=1 TO nf
3340 PRINT f$(j); TAB 8;a$(i,f(j
,1) TO f(j,2)): PRINT ''
3350 NEXT j
3360 PRINT #1;"PRESS ANY KEY FOR
 NEXT RECORD": PAUSE 0: CLS
3370 NEXT I
3375 OPEN # 2,"S"
3380 RETURN
3499 REM ********************
        *SORT ROUTINE       *
        ********************
3500 GO SUB 5500
3540 IF  NOT fn THEN  RETURN
3541 PRINT  AT 10,10; FLASH 1; I
NK 2;"SORTING"
3545 LET sf=0
3560 FOR i=2 TO nru-1: IF a$(i+1
,f(fn,1) TO f(fn,2))<a$(i,f(fn,1
) TO f(fn,2)) THEN  LET s$=a$(i)
: LET a$(i)=a$(i+1): LET a$(i+1)
=s$: LET sf=sf+1
3570 NEXT i
3580 IF sf <> 0 THEN  GO TO 3545
3590 RETURN
3699 REM ********************
        *   ALTER ROUTINE   *
        ********************
3700 GO SUB 5500: IF  NOT FN THE
N  RETURN
3710 GO SUB 5600: IF  NOT RN THE
N  RETURN
3715 CLS
3720 FOR i=1 TO nf
3730 PRINT  AT 2*i,0;f$(i);"  ";
```

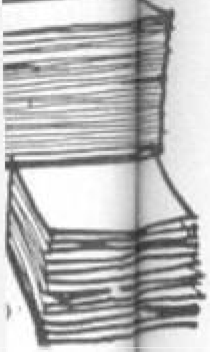
```
a$(rn,f(i,1) TO f(i,2)); FLASH 1
;" "; FLASH 0
3740 INPUT q$: IF q$ <> "" THEN
 LET a$(rn,f(i,1) TO f(i,2))=q$
3750 PRINT  AT 2*i,0;f$(i);"  ";
a$(rn,f(i,1) TO f(i,2));"      "
3760 PRINT
3770 NEXT I
3780 INPUT "ALTER ANYTHING(Y/N)"
;Q$: IF Q$="Y" THEN  GO TO 3720
3790 RETURN
3999 REM ********************
         * DELETE ROUTINE  *
         ********************
4000 GO SUB 5500: IF  NOT fn THE
N  RETURN
4010 GO SUB 5600: IF  NOT rn THE
N  RETURN
4020 FOR i=rn+1 TO nru: LET a$(i
-1)=a$(i): NEXT i
4030 LET nru=nru-1: LET a$(1,11
TO 13)= STR$ nru
4040 RETURN
5499 REM ********************
         *FIND KEY FIELD NO. *
         ********************
5500 CLS : INPUT "NAME OF KEY FI
ELD: ";Q$
5505 LET fn=0
5506 IF q$="" THEN  RETURN
5510 FOR i=1 TO nf
5520 IF f$(i, TO  LEN Q$)=q$ THE
N  LET fn=i
5530 NEXT i
5540 IF  NOT fn THEN  GO TO 5500
5550 RETURN
5599 REM ********************
         *FIND RECORD NUMBER *
         ********************
5600 CLS : INPUT "VALUE OF KEY:
";r$
5605 IF r$="" THEN  RETURN
5606 IF  LEN r$<f(fn,2)-f(fn,1)+
1 THEN  LET r$=r$+" ": GO TO 560
6
5610 LET rn=0
5630 FOR i=2 TO nru
5640 IF a$(i,f(fn,1) TO f(fn,2))
=r$ THEN  LET rn=i
5650 NEXT i
5660 IF  NOT rn THEN  GO TO 5600
5670 RETURN
```





Listing 2: Letters

```
1000 GO SUB 9970
1005 INPUT "DATE OF LETTERS";d$
1010 LET q$="ACCNO": GO SUB 9980
: LET n1=fn
1011 INPUT "HARD COPY(Y/N)";O$:
IF O$="Y" THEN  OPEN # 2,"P"
1020 LET q$="INVNO": GO SUB 9980
: LET n2=fn
1030 LET q$="NAME": GO SUB 9980:
 LET n3=fn
1040 LET q$="INVDAT": GO SUB 998
0: LET n4=fn
2000 FOR i=3 TO nru
2010 PRINT '''
2020 LET x1=i: LET x=n1: GO SUB
9920
2030 PRINT "ACCOUNT: ";q$'
2060 LET x1=i: LET x=n2: GO SUB
9920
2070 PRINT "INV No: ";q$;
2071 PRINT ''
2075 LET x1=2: LET x=n3: GO SUB
9920
2076 PRINT ' TAB 10;q$'
2080 LET x1=2: LET x=n3+1: GO SU
B 9920
2090 PRINT  TAB 10;q$'
3000 FOR j=2 TO 4
3010 LET x=n3+j: GO SUB 9920
3020 PRINT  TAB 10;q$
3030 NEXT j
3040 PRINT
3050 PRINT  TAB 10;"DATE: ";d$
3060 PRINT '''
3070 LET x1=i: LET x=n3: GO SUB
9920
3080 PRINT "Dear ";q$;","
3090 PRINT '''   I refer to our
invoice dated"''
4000 LET x1=i: LET x=n4: GO SUB
9920: GO SUB 9940
4010 PRINT q$;". I would be grat
eful if "'''"you would settle the
 account"'''"as soon as possible.
"''
4020 PRINT  TAB 10;"Yours sincer
ely,"'''''; TAB 10;"N.E.SALT"'
4030 PRINT #1;"PRESS ANY KEY TO
CONTINUE": PAUSE 0: CLS
4040 NEXT i
4045 OPEN # 2,"S"
4050 STOP
```



Listing 3: Toolkit

```
9900 REM ********************
         *      TOOLKIT     *
         *ROUTINES TO MERGE *
         *WITH YOUR PROGRAMS *
         *TO HANDLE FILES   *
         *CREATED BY DATAFILE*
         ********************
9901 REM ********************
         *ADDRESSES OF ROUTINES
         *9920:-GET FIELD   *
         *      CONTENTS    *
         *9940:-DECODE DATE *
         *9950:-REMOVE SPACES *
         *9960:-READ HEADER *
         *9970:-LOAD FILE   *
         *9980:-GET FIELD NO. *
         *9990:-GET RECORD NO.*
         ********************
9919 REM ********************
         *  GET FIELD VALUE *
         *     FROM FILE    *
         *VARIABLES:        *
         *RN= RECORD NO. AND *
         *     IS SUPPLIED BY *
         *     THE SUB AT 9990*
         *FN= FIELD NO. AND *
         *     IS SUPPLIED BY *
         *     THE SUB AT 9980*
         *F() IS THE ARRAY  *
         *     DEFINED BY THE *
         *     SUB AT 9960 AND*
         *     IT HOLDS THE  *
         *     POSITION OF THE*
         *     THE FIELDS IN *
         *     THE RECORD    *
         ********************
9920 LET q$=a$(rn,f(fn,1) TO f(f
n,2))
9922 GO SUB 9950
9923 RETURN
9939 REM ********************
         *    DATE DECODE   *
         *VARIABLES:        *
         *Q$ IS A DATE IN THE*
         *   FORMAT YY/MM/DD *
         *   THIS FORMAT CAN *
         *   BE USED TO MAKE *
         *   SORTING BY DATE *
         *   WITHIN DATAFILE *
         *   EASIER          *
         *   ON EXIT FROM THE*
         *   SUB Q$ HOLDS THE*
         *   DATE IN DD/MM/YY*
         *   FORMAT          *
         ********************
9940 LET q$=q$+q$(1 TO 2)
9941 LET q$( TO 2)=q$(7 TO 8)
9942 LET q$(7 TO 8)=q$(9 TO 10)
9943 LET q$=q$( TO 8)
9945 RETURN
9949 REM ********************
         *  REMOVE TRAILING *
         *      SPACES      *
         *VARIABLES:        *
         *Q$ IS A FIELD GIVEN *
         *   BY THE USER OR  *
         *   THE SUB AT 9920 *
         *   THE ROUTINE REMOV*
         *   ES ANY SPACES AT *
         *   THE END OF THE  *
         *   STRING TO AVOID *
         *   UNSIGHTLY GAPS IN*
         *   PRINTED TEXT    *
         ********************
9950 IF q$( LEN q$)=" " THEN LE
T q$=q$( TO  LEN q$-1): GO TO 99
50
9951 RETURN
9960 REM ********************
         *HEADER        READ *
         *VARIABLES:        *
         *A$(NR,SR)=A FILE  *
         *         CREATED BY*
         *         DATAFILE *
         *NR=NUMBER OF RECS *
         *SR=SIZE OF EACH REC*
         *NF=NUMBER OF FIELDS*
         *NRU=NUMBER OF RECS *
         *   USED           *
         *F$(NF,6) HOLDS THE *
         *    NAMES OF FIELDS*
         *    ON THE FILE   *
         *F(NF,2)  HOLDS THE *
         *    POSITION OF THE*
         *    FIELDS WITHIN *
         *    EACH RECORD   *
         ********************
9961 CLS : LET nr= VAL a$(1,2 TO
 4): LET sr= VAL a$(1,5 TO 7): L
ET nf= VAL a$(1,8 TO 10): LET nr
u= VAL a$(1,11 TO 13)
9962 DIM f$(nf,6): DIM f(nf,2)
9963 FOR i=0 TO (nf-1)*12 STEP 1
2
9964 LET f$(i/12+1)=a$(1,14+i TO
 14+i+5)
9965 LET f(i/12+1,1)= VAL a$(1,1
4+i+6 TO 14+i+8)
9966 LET f(i/12+1,2)= VAL a$(1,1
4+i+9 TO 14+i+11)
9967 NEXT i
9968 RETURN
9969 REM ********************
         *     LOAD FILE    *
         *VARIABLES:        *
         *Q$= THE NAME GIVEN *
         *    BY THE USER TO *
```

```
          *     A FILE CREATED *
          *     BY DATAFILE    *
          *A$= THE ARRAY IN    *
          *     WHICH DATAFILE *
          *     STORES FILES   *
          **********************
9970 CLS
9971 LOAD q$ DATA A$()
9972 GO SUB 9961
9973 RETURN
9980 REM **********************
          *FIND KEY FIELD NO. *
          *VARIABLES:         *
          *Q$= THE NAME OF THE*
          *  FIELD TO BE FOUND*
          *F$(NF,6) HOLDS THE *
          *  NAMES OF FIELDS  *
          *  ON FILE          *
          *FN= THE NUMBER OF  *
          *  FIELD CALLED Q$  *
          *   IF IT IS ON FILE *
          *  AND IF NOT THEN 0*
          **********************
9981 CLS
9982 LET fn=0
9983 IF q$="" THEN  RETURN
9984 FOR i=1 TO nf
9985 IF f$(i, TO  LEN q$)=q$ THE
N  LET fn=i
9986 NEXT i
9987 IF  NOT fn THEN  CLS : PRIN
T "FIELD ";q$;" NOT IN THIS FILE
": STOP
9988 RETURN
9989 REM **********************
          *FIND RECORD NUMBER *
          *VARIABLES:         *
          *Q$ HOLDS THE VALUE *
          *    OF FIELD NUMBER *
          *    FN THAT IS REQD *
          *RN= THE NUMBER OF  *
          *    THE RECORD WHICH*
          *    HAS Q$ IN FIELD *
          *    NUMBER FN OR 0  *
          *    IF NO SUCH RECORD*
          *    EXISTS          *
          **********************
9991 IF q$="" THEN  RETURN
9992 IF  LEN q$<f(fn,2)-f(fn,1)+
1 THEN  LET q$=q$+" ": GO TO 999
2
9993 LET rn=0
9994 FOR i=2 TO nru
9995 IF a$(i,f(fn,1) TO f(fn,2))
=q$ THEN  LET rn=i
9996 NEXT i
9997 IF  NOT rn THEN  CLS : PRIN
T "RECORD WITH KEY VALUE ";q$;"
NOT FOUND": STOP
9998 RETURN
```


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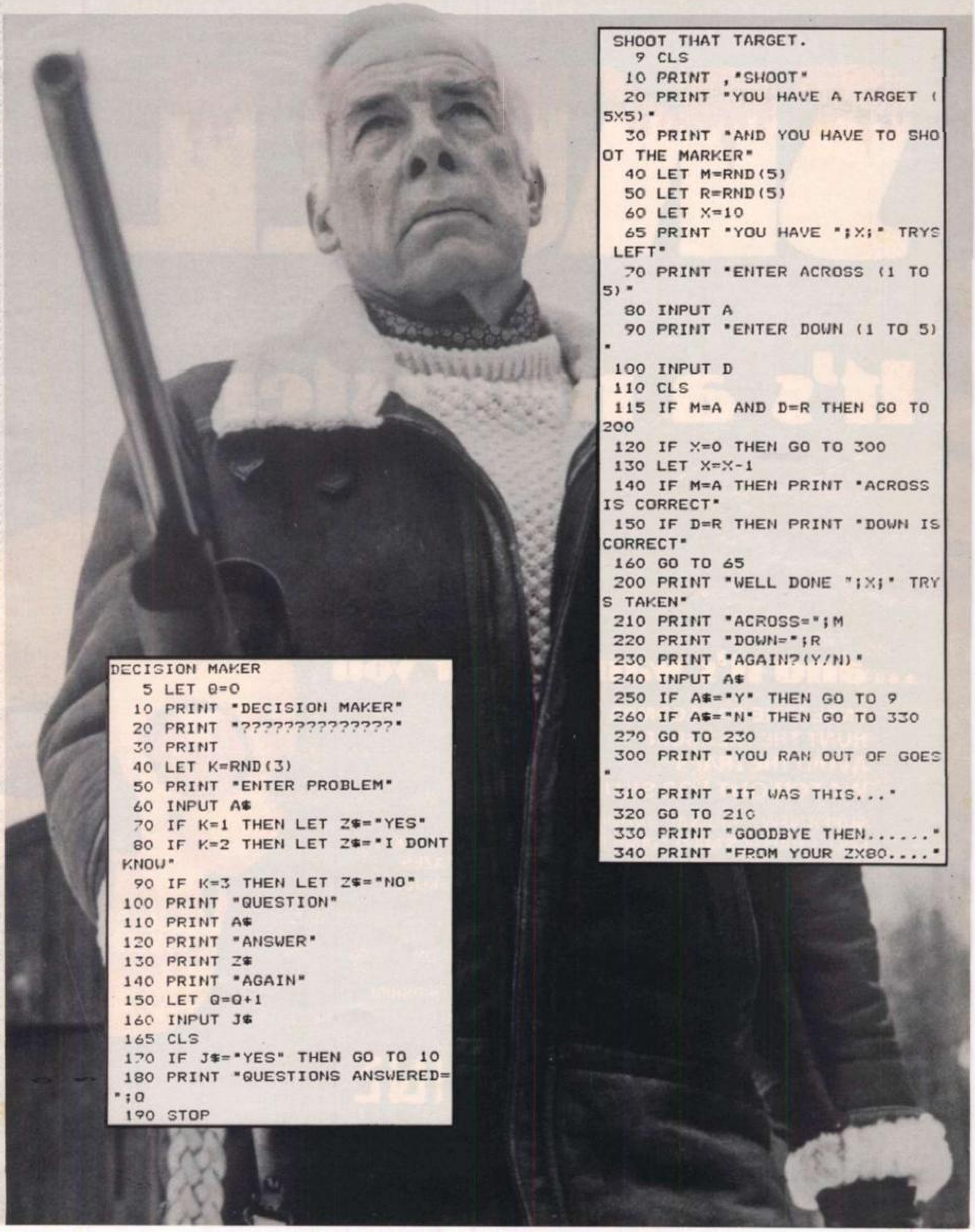
Shoot the Target is a game of luck and perception. There is a 5 × 5 grid on which is placed a marker and you have ten goes in which, to discover it's position. If you hit the marker then you will be told how many tries remain, the co-ordinates and asked if you wish to play again. If you fail then you are told the correct position and offered another go.

Decision Maker reminds me of conversations with my parents! A nice, humourous little listing which could keep a non-computist happy for hours!



Shoot and decide

Two ZX80 programs from Andrew Haslam to challenge and amuse.



```
SHOOT THAT TARGET.
   9 CLS
  10 PRINT ,"SHOOT"
  20 PRINT "YOU HAVE A TARGET (
5X5)"
  30 PRINT "AND YOU HAVE TO SHO
OT THE MARKER"
  40 LET M=RND(5)
  50 LET R=RND(5)
  60 LET X=10
  65 PRINT "YOU HAVE ";X;" TRYS
 LEFT"
  70 PRINT "ENTER ACROSS (1 TO
5)"
  80 INPUT A
  90 PRINT "ENTER DOWN (1 TO 5)
"
 100 INPUT D
 110 CLS
 115 IF M=A AND D=R THEN GO TO
200
 120 IF X=0 THEN GO TO 300
 130 LET X=X-1
 140 IF M=A THEN PRINT "ACROSS
IS CORRECT"
 150 IF D=R THEN PRINT "DOWN IS
CORRECT"
 160 GO TO 65
 200 PRINT "WELL DONE ";X;" TRY
S TAKEN"
 210 PRINT "ACROSS=";M
 220 PRINT "DOWN=";R
 230 PRINT "AGAIN?(Y/N)"
 240 INPUT A$
 250 IF A$="Y" THEN GO TO 9
 260 IF A$="N" THEN GO TO 330
 270 GO TO 230
 300 PRINT "YOU RAN OUT OF GOES
"
 310 PRINT "IT WAS THIS..."
 320 GO TO 210
 330 PRINT "GOODBYE THEN......"
 340 PRINT "FROM YOUR ZX80...."
```

```
DECISION MAKER
   5 LET Q=0
  10 PRINT "DECISION MAKER"
  20 PRINT "??????????????"
  30 PRINT
  40 LET K=RND(3)
  50 PRINT "ENTER PROBLEM"
  60 INPUT A$
  70 IF K=1 THEN LET Z$="YES"
  80 IF K=2 THEN LET Z$="I DONT
KNOW"
  90 IF K=3 THEN LET Z$="NO"
 100 PRINT "QUESTION"
 110 PRINT A$
 120 PRINT "ANSWER"
 130 PRINT Z$
 140 PRINT "AGAIN"
 150 LET Q=Q+1
 160 INPUT J$
 165 CLS
 170 IF J$="YES" THEN GO TO 10
 180 PRINT "QUESTIONS ANSWERED=
";Q
 190 STOP
```

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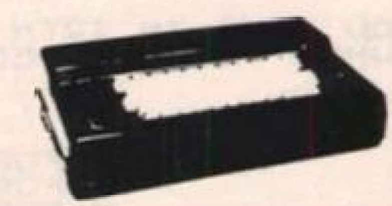
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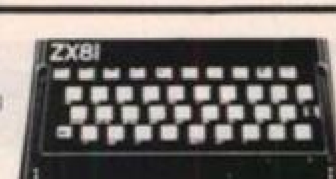
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SAE FULL CAT

The ZX81 soft selection

In which Nick Pearce casts a critical eye over some of the latest software releases.



3D Grand Prix — DK Tronics

Having recently spent a considerable amount of time on the Spectrum negotiating the various circuits of Psion's Chequered Flag, I wasn't expecting too much of this ZX81 program — no colour, sound and chunky graphics. I must admit, however, that I was favourably impressed by this simulation from DK Tronics.

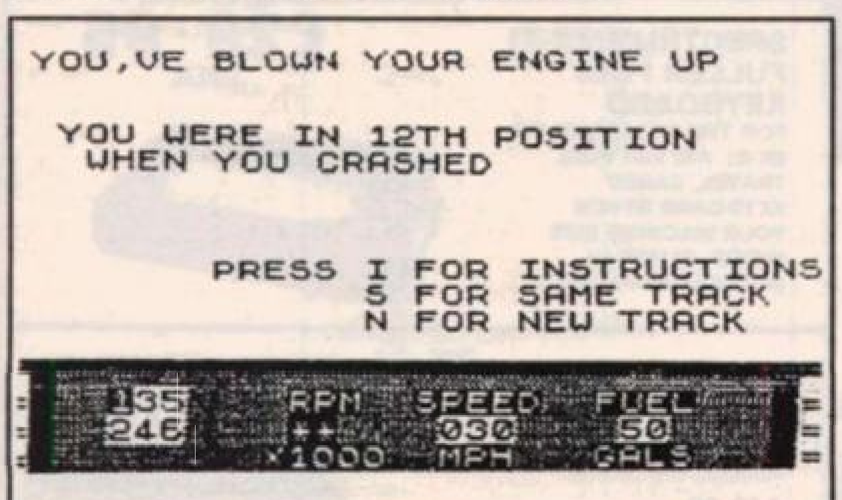
The dashboard is displayed on screen and shows gear, speed and rpm indicators and your fuel guage. You have a perspective view of the track as from the driving seat of a Formula 1 racing car and see the other cars on the track as you pass them or are overtaken yourself.

Unlike Chequered Flag, cornering is no problem providing that your speed is not excessive. The car takes bends automatically, left and right steering puts you on the appropriate side of the track for overtaking. You do have control over the gears (there are six of them), throttle and brakes.

Weather effects, mechanical failures and pit stops all feature in this game with each race lasting five laps, unless you succumb to one of the numerous hazards faced by the Grand Prix driver. I found that it required careful concentration to avoid crashing into the back of slower cars ahead for at 180 mph there is not much time in which to react!

An excellent simulation.

3D Grand prix costs £4.95 and is available from DK Tronics Ltd, Unit 6, Shire Hill Estate, Saffron Walden, Essex CB11 3AQ.





Cosmic Guerilla — Quicksilva

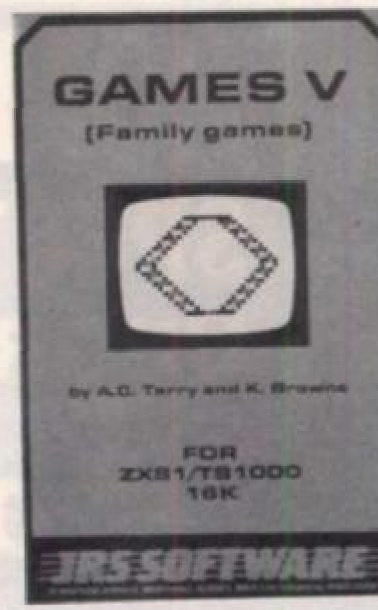
Cosmic Guerilla is a fast moving arcade-type game. Contrary to the note on the cassette insert card, there are no on-screen instructions but it is not difficult to play. Key 6 moves you left, 7 moves you right and 0 fires. The speed of play is selected from a choice of three — I preferred the fasted of the three, action is very smooth and responsive at that level.

The object of the game is to defend your city from marauding space guerillas — you shoot them down from your ship which moves along the base of the screen. As you knock out the raiders they leave their plunder littering the skies. As this loot is impervious to your missiles and remains in the sky, it becomes more difficult to shoot at the guerillas as the game progresses.

These guerillas are not just sitting ducks, they are programmed with some 'intelligence' and do not fly into your missile tracks. They therefore can be quite difficult to destroy. I got rid of the first batch without too much trouble but the problem is that successive armies appear. A score card is kept and the game ends with the loss of all three of your lives.

Another good buy from Quicksilva.

Cosmic Guerilla costs £3.95 and is available from Quicksilva, Palmerston Park House, 13 Palmerston Road, Southampton SO1 1LL.



Games V (Family Games) — JRS

Games V contains two impressive games, Sleuth and Roulette, both for the 16K ZX81. Both of the programs incorporate a 'fast load' system. This effective technique means that LOADing time is cut from five minutes to about 60 seconds.

In Sleuth, one to six people can play at being private detectives. The winner is the player who correctly identifies the murderer guilty of the crime

committed at the infamous Roxy Club. The computer sets the scene and circumstances of the crime. There are fifteen suspects and a total of sixteen clues in form of questions which may be asked of the suspects. The problem is that each suspect will only answer certain questions and will also lie in certain circumstances.

Only one accusation is allowed per player and a pen and paper to keep a record of the suspect's response is essential. It takes a long time to sift through the evidence and then deduce the identity of the killer. I was absorbed for two hours and still got the answer wrong!

I would have liked the facility to print out the suspect list and the list of questions, that option was not included in the review copy. Each game is different and takes only a few seconds to set up. All in all, Sleuth is an absorbing, if frustrating, family game.

Roulette is also a game for up to six players, with the computer as banker. To start, each player is given 100 francs and enters his or her name. Up to ten stakes are permitted in each game and bets are placed utilising a very effective display of the roulette board. All the normal bets can be placed, from any individual number paying 35 to 1, to rouge, noir, pair, impair, manque and passe paying even odds. The prompts are in French to create the right atmosphere. If your French is anything like mine you'll need the instruction sheet at hand for the first few games to give you the translations!

An impressive simulation — bon chance!

Games V costs £4.95 and is available from JRS Software, 19 Wayside Avenue, Worthing, Sussex BN13 3JN.







Classic 3 — Axis Software

This cassette contains three rather routine games — Hangman, Codebreak and Pairs. They are all the sort of games that the new ZX81 owner might try to program himself but they are good versions and run well.

Hangman offers a total of 450 words and there are three levels of difficulty — increasing difficulty being represented by six, eight and ten letter words. The letters tried are displayed on the screen throughout each game.

Codebreak is a version of the popular game in which you have to try and decipher a secret number code, in this case chosen by your ZX81. The computer selects a four or five digit number made up of the numbers one to six. After each guess from the player the screen indicates how many numbers were absolutely correct and how many were correct but in the wrong place. A game to test your powers of logic.

In the well known game of Pairs the screen displays twenty blocks identified by the letters A to T. The player chooses two letters and the numbers under those blocks are revealed — if they don't match then they are hidden again. The object is to find all the pairs in as few tries as possible — a good memory training exercise.

These three cerebal games from Axis Software on one cassette make Classic 3 a good buy.

Classic 3 is available from Axis (UK) Ltd, 71 Brookfield Avenue, Loughborough, Leics. LE11 3LN.



Screen illustration from Classic 3.

Tempest — Mikro-Gen

Tempest is a fast moving arcade-type game. The object is to survive for as long as possible against a variety of aliens. There are five different types of alien which attack your ship from left to right across the screen: some fire missiles and others lasers. The lasers of the Liner aliens are particularly difficult to avoid and cannot be shot down. You aim for a maximum number of points and have five lives.

Once you have sucessfully defended a sector on the left of the screen for a preset time, the aliens gradually die out and you start moving to the right. To complete the sector you must reach the right side of the screen avoiding the 'spikes'. If things get too difficult then you can destroy everything on screen with your 'superzapper' but you only have one per sector and although it saves your life, it doesn't score any points.

There are five levels of play and I found even the easiest level difficult; mainly because the Liners' lasers invariably destroy you once they start to home in on your ship. However, the action in Tempest is fast and smooth and the game performs well. At £4.95 it is a reasonable buy.

Tempest is available from Micro-Gen, 1 Devonshire Cottages, London Road, Bracknell RG12 2TQ.

Community Chest — Artic

This is a condensed version of the popular property game and contains thirteen sites, community chest/chance and jail. The rules are broadly comparable with the board game, but the site prices and fines are much higher. You have £2,500 to start but with the prices ranging from £750 for Old Kent Road to £9990 for Mayfair, it takes a good few circuits of the board passing GO or a lot of luck to become a man of property.

In Community Chest your opponent is the computer — it is also banker and dice thrower, makes all the moves and monitors progress. The board is displayed on screen throughout the game, a feature not included in some other ZX81 simulations which trade off the screen in favour of a larger site list.

If you cannot find a willing human opponent and wish to play against your ZX81 then this is a good version and well worth considering. It is not a full simulation but I like the way in which Artic display the board throughout the game.

Community Chest costs £4.95 and is available from Artic Computing Ltd, Main Street, Brandesburton, Driffield YO25 8RG.



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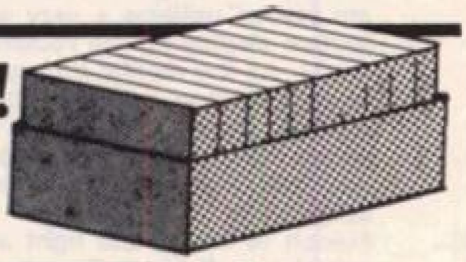
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You battling the computer in this popular board game. Set your fleet, computer is random.

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An original board game for 2 players. Each player has 6 commandos and a field gun. Capture the enemies flag. Hidden mines and action graphics.

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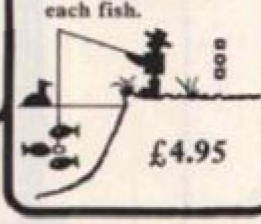
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Club corner



Bombay Microcomputer Club

Dear ZX Computing,
We have recently formed a microcomputer user's club in Bombay, meeting on every second and fourth Saturday night at 6.00pm. Anyone who owns a personal computer, whether it is a Spectrum, ZX81, TRS-80, Apple, Commodore or any other Indian or foreign model can join.

The club is very much a non-profit organisation with positive social aims — the main aim being to create a greater computer awareness. To this end we are organising lessons in BASIC and a 'Microcomputer Exposure' day.

In view of inadequate services available in India we would welcome help in any form from other clubs and organisations. Looking forward to receiving newsletters/club magazines/product news, I am, yours sincerley

Anis H Millwalla
Hon Secretary
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Microsoftware Club

Dear ZX Computing,
We have been prompted to write to you after reading a letter in Club Corner from Nathan Carney in Moseley. To the best of our knowledge, we are the only our Spectrum user group in and around Moseley and possibly even in Birmingham.

Microsoftware Club is open to Spectrum owners throughout the UK. We communicate with each other via our bi-monthly magazine on cassette which costs £1.50 to members (£1.99) to non-members) or £7.50 for one years subscription (£10.00 to non-members). One thing that we all have in common is that we all own a Spectrum — an ideal means of communication.

MSWM readers contribute to the magazine by sending letters, programming tips, programs and so on. They may ask questions or give the answers to other readers' queries. The most important aspect of all this is that we can help each other across the miles and thereby learn about the Spectrum that much faster. All programs may be listed and there are plenty of REM statements for easy guidance. Spectrum owners may also be put in touch with other members (or readers) in their own area if they so wish.

Through the magazine we can really club together and become the only Spectrum Users Multi-Club offering all these things and more at little cost. Anyone interested in our services should send an sae for full details to the address below. Good luck with your magazine in 1984, it is by far the best!
Yours sincerely

T Storton
73 Alcester Road
Moseley
Birmingham 13

Aylesbury Computer Club

Dear ZX Computing,
With the large increase in the variety of home computers over the last year, the Aylesbury ZX Computer Club has decided to drop the ZX from its name in order to cater for all types of microcomputer.

As the main microcomputer club in the area, the Aylesbury group have found that despite the fact that it was primarily a Sinclair user group, users of micros other than the ZX series have been drawn to the club. With the initials ZX now dropped from its name, the club has formalised its interest in all makes of home computer.

The club will continue to hold weekly meetings at Quarrendon School (each Friday at 7.30 pm) and monthly meetings at the Mandeville Centre. Further information on the facilities offered by the club and its activities can be obtained from myself, on Aylesbury 630867.

Dr David Nowotnik
Secretary
Aylesbury Computer Club

Sussex ZX Computer Club?

Dear ZX Computing,
I would like to see if there is a club in my area and if so, would like some information about it. If there is no exisiting group then I would like to start my own ZX Computing Club and see if there are any 'like minded enthusiasts' that might like to join.
Yours sincerely

Daren Benfield
9 Smith Close
Southgate
Crawley
Sussex

Norwich Computer Club?

Dear ZX Computing,
I have been a reader of ZX Computing for four issues now and I have not seen any mention of a Norwich Computer Club. Is there a club in the Norwich area? If not, I should be interested in starting one myself. Please contact me at the address below if you are interested. I own a 48K Spectrum
Yours sincerely

Gregory Norton
The Vicarage
Eleanor Road
Norwich NR1 2RE

Carlisle Micro Computer Club

Dear ZX Computing,
May I use the good offices of your magazine to publicise the information of the Carlisle Micro Computer Club.

We meet on Friday evenings from 7.30 to 10 pm at Currock Community Centre, and will be delighted to welcome any new members.

As secretary of the Club I can be contacted on Carlisle 23314.
Yours sincerely

D Scott

If you run, or are a member of a user club which caters for the Sinclair user, why not get your group on the map by writing to us at:

Club Corner,
ZX Computing,
1 Golden Square,
London W1R 3AB

All you have to do is to send us a letter with details of your club's activities (times of meetings, addresses of who to contact etc.) and we'll do the rest. If you publish a newsletter or club magazine, we'd very much like to see that too.

And if you don't see a club in your area, why not start one up by writing to *ZX Computing* and seeing if any like-minded enthusiasts wish to join you.

Quicksoft

Clive Smith takes a look at a mixed bag of programs.

Lojix — Virgin Games

Written by Steve Webb for Virgin, Lojix is a very old game brought up to date for the computer. The game consists of a gridded square and various shapes that if put together correctly, will fit into the square. You first have to choose the shape you want to start with and then move a cursor across the grid — pressing a key will drop the shape into the grid. There is a facility to rotate your shape until it fits into the correct place in the square.

The screen display and key operation are fair enough and you get the usual biography of the programmer on the inlay. Virgin keep 50 pence for every tape sold in a special bank account and claim that if you can solve the puzzle and keep your sanity they will give you the entire contents of the account. If you do manage to crack the puzzle there is a section to fill in on the inlay beside the instructions of the game.

Basically though, Lojix is just a jigsaw puzzle and I would have thought that a company like Virgin would have come up with something a little more imaginative than this. If you are into puzzles like Mr Webb, you may find this enjoyable but if you prefer arcade-type games then I would not recommend it.

Lojix costs £5.95 and is available from Virgin Games, 61-63 Portobello Road, London W11.

ZX Draughts — CP Software

ZX Draughts should have been called 'Anthill' — it has more bugs in it than a termites nest! I hope this isn't their production model. I managed to load it with little trouble and a chess board appeared on the screen.

Moves are made by simple co-ordinates (a4-b5) as with a lot of chess games. This is where the trouble started, most of my legitimate moves were greeted with "move impossible". I fiddled about for ages and made a few moves and when I took one of the computer's pieces it took my piece off the board. The darned thing cheats as well!!!

CP Software is at 17 Oreland Lane, Prestwood, Great Missenden, Bucks.



Wilfred the Hairy, Olaf the Hungry! — Microbyte

A strategy game for the 48K machines — very boring and full of bugs. I did manage to play part of the game until I hit the bugs.

The screen displays a crude map of the world and you, being Olaf, have to occupy as many continents as possible whilst your opponent, Wilf the computer, is trying to do the same. Your progress is mapped by a blue flag every time you make a move and, boy it's slow. Sorry Microbyte, I was not very impressed.

Microbyte can be found at 19 Worcester Close, Lichfield, Staffs.

Royal Birkdale — Hornby Software

As you can guess, Royal Birkdale is a golf game. This is one of a series of golf courses you can choose from with each one based on the real golfcourse with the same distances and bunkers. You have a choice of 1 or 2 players and after entering your handicap you then choose which hole you would like to play first.

The computer then goes on to draw the chosen hole from a birds eye view, graphically not very exciting. Under the hole is a scale telling you what sort of distance it is from your ball to the hole.

You have a full range of clubs to choose from, eight irons plus a sand wedge, five woods and a putter. Before you tee off you have to enter whether you want to use an iron or a wood, each club of course will give you different distances. Once you have chosen your weapon, it then asks you how hard you would like to hit the ball by feeding in a %. 100% will give a full power shot and 5% is a quick tap. You are then asked if you would like a straight shot or if you would like to hook or fade the ball and the direction in which you would like to hit the ball (it does help).

There is a 360 degree protractor on the screen to help you choose the correct angle, once this is entered the ball is struck and a tracer shows where the ball travels. If you happen to end up in the heather an irate man jumps up and down, I think you must have hit him on the head!

If you are an all-action 'shoot 'em up' video game player then this is not for you. If you are a golf player and if the golf course is covered in snow or you have a broken leg then perhaps this may keep you amused.

Hornby Software is at 21 Pinford Hill, Leeds.

River Rescue — Thorn EMI

This is one of the most addictive games I've played in a long time. Written in machine code, it has nice, smooth, rolling graphics. It can be played by one or two players and each is given five boats.

The aim of the game is to drive a speed boat up a river dodging the crocs and islands or your boat will break up and sink. The boat is armed with a machine gun which shoots the crocs or logs that are in your way. At various stages along your route you have to land the boat alongside a jetty and rescue a little man. There's one man per jetty and once you have a boat load you have to sail upstream to the next jetty. The boat can be made to move either side to side or up and down the river. There are five keys to use, Q, A, O, P and 0 to fire the gun although it is also joystick compatible.

Just when you think you are doing well an aeroplane flies over and drops mines in your way, if you don't shoot them in time you are blown up. I have to confess that I have yet to rescue all the men. It looks so easy but it's not and it keeps me occupied for hours. Graphically it's not very exciting but it is produced well.

One thing I appreciated with this game was the speed in which a new game is set up, unlike some where you get the software company's name flashing on and off the screen and a two minute song to go with it.

The game has a scoring system and points can be gained by shooting the crocs or logs. Definitely worth a trip to your local stockist to get yourself a copy.

River Rescue is priced at £6.95 and is available from all leading software stockists.

Can you meet Laserwarp's infinite Challenge?

Be a real game lord – imagine the quest for the ultimate high score!

At last – a real challenge for the arcade ace: Laserwarp, the most exciting arcade-style game around, in full, high-res graphics. It's got everything – fight your way through the ramships, space mines, homing droids, hyperspace chickens, interstellar pogos, and more, till you challenge the Master. Can you beat him? Can anybody beat him? Comes complete with Hall of Fame, coded verifiable high score – send yours in and see if you can win the £100 Mikro-Gen are offering every month (full details in instructions)

High scorers names will be published in a Hall of Fame in the computer press – and they will be invited to join in a Battle of the Champions.

NB – If you have the earlier version of Laserwarp, Mikro-Gen will replace it with the new version – FREE!

£100
EACH & EVERY MONTH
for Laserwarp highest score!



✱ Star Trek

AND NOW ✱

You won't find a more exciting version of this superb tactical role- play game – save the star systems from the Klingon attack. Runs in real time – so you have to make the right decisions fast. Comes complete with Captain's Log & Operating Manual

✱ FOR 48K SPECTRUM

£7.95



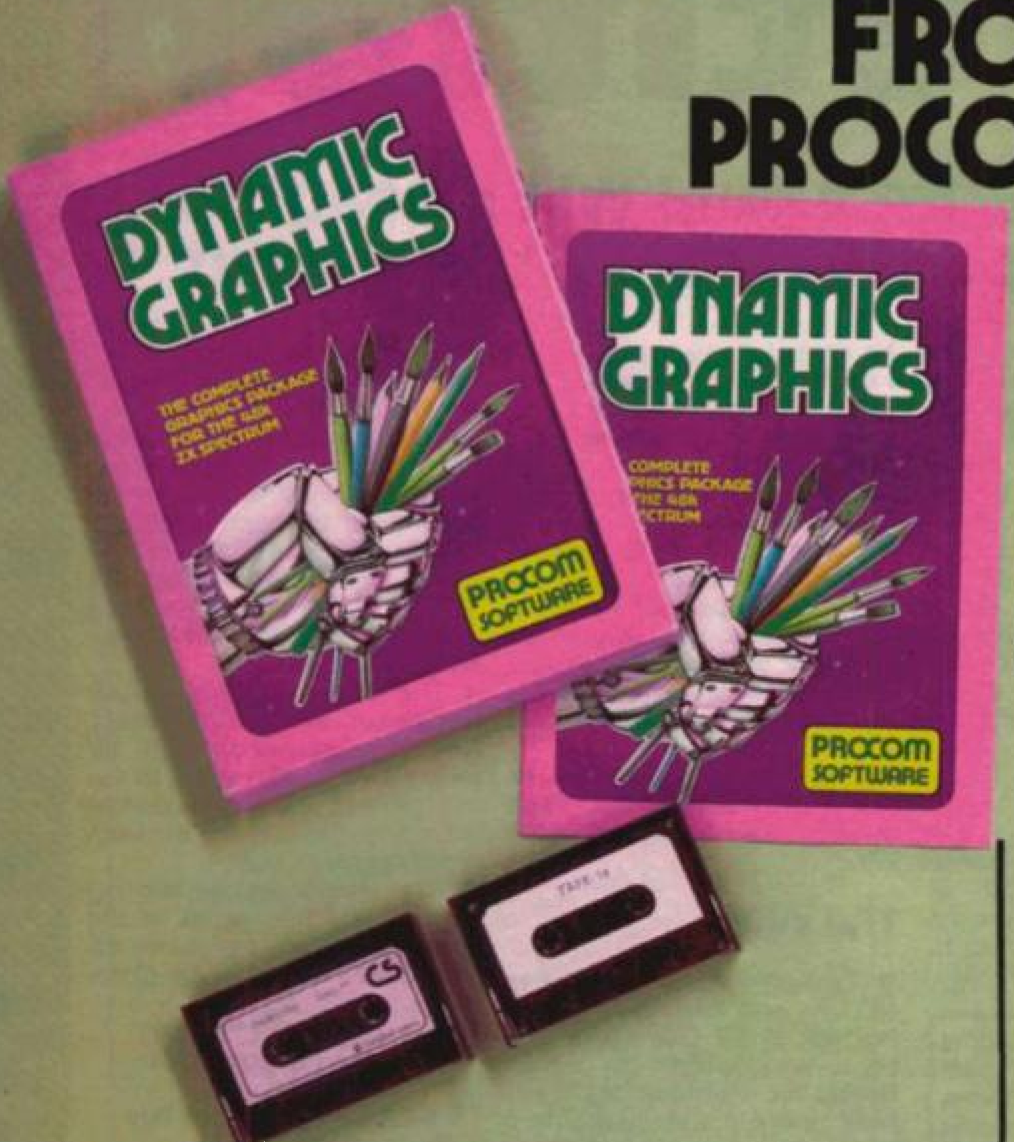
Just part of Mikro-Gen's great range – look out for Paradroids, Mad Martha II, Cruise Attack, Land of Sagan, Galakzions, Deffendar and many others. Available from WH Smith, Co-op, Boots, Menzies & other leading retailers, or direct from Mikro-Gen (Please make cheque/PO payable to Mikro-Gen & add 40p post & packing

PHONE YOUR VISA/ACCESS NUMBER

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THE FIRST IN DYNAMIC PACKAGES FROM PROCOM



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Whether you are a beginner or an experienced programmer it will make no difference with the DYNAMIC GRAPHICS package from Procom. You will be able to program professional looking graphics on your Spectrum. DYNAMIC GRAPHICS comes in two cassettes at the price you would normally pay for one. But do not let the low price put you off. DYNAMIC GRAPHICS is by far the most unique and much needed software aid on the market today.

ONLY £14·95 inc. VAT and P&P.

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2. DYNAMIC ANIMATION
3. DYNAMIC SOUNDS
4. DYNAMIC FILING
5. DYNAMIC EDITOR & ASSEMBLER

ITEMS ABOVE WILL SHORTLY BE AVAILABLE FOR MOST HOME COMPUTERS

PLUS BONUS PROGRAM A SPRITE SUBROUTINE GENERATOR
THIS ALLOWS YOU TO INCORPORATE SPRITE SUBROUTINE INTO YOUR OWN PROGRAM

TAPE 1
This is a character designer with a difference ★ Full screen animation of sprites ★ 27 functions including sprite handling 96 characters which can be saved on tape to use in your own programs ★ Easy methods of including character designs in your own basic programs ★ No knowledge of machine code needed ★ Screen saving ★ Sprites may be treated as super large characters (4x4). The list is endless. You will be able to design literally thousands of different characters from Pac Men to space men or space ships to battleships.

TAPE 2
This is the ultimate utility for composing hi-res graphics on your Spectrum. As well as essential hand draw cursor controls (or joystick) there are many advanced features, such as fast fill and rescale.
There are in all over 50 commands. A constantly updated status display.
Generated prompts are fully displayed. Now you can design screens as good as the software companies.

EASY TO USE

DYNAMIC GRAPHICS is the one that everybody will understand. The instruction manual is simplicity itself. No more strained eyes — the manual has large 10 x 8 pages with plenty of diagrams to make it easy for you.

YOUR TICKET TO RICHES?

Use DYNAMIC GRAPHICS to make up your own program, and if it's good we will market it for you and maybe make you rich.

DYNAMIC GRAPHICS

HOW TO ORDER

Telephone orders (01) 508 1216
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Simply write your requirements in the coupon provided, enclose your cheque/P.O or use your Access or Barclaycard. Please make cheque payable to: PROCOM SOFTWARE and post to address below. Allow 7 days for delivery

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Competition

Have some fun and write a pun! Win a beautiful cabinet in this competition for all the family!

There comes a time when the family telly is being used just as much for the computer as for the broadcast programs. Kneeling in front of the coffee table with leads around your feet and Mum/Dad/brother/sister/son/daughter/wife/husband/dog/cat moaning about the program they're missing, you realise that the time has come to get a television set specially for the computer.

Once you have the set, your problem then becomes where to keep it! Continually setting it up and taking it apart, as well as being irritating, adds to the wear and tear on your equipment.

So, in our ceaseless fight against domestic disharmony, this issue we are offering as a prize a beautiful computer cabinet from Marcol Cabinets which will keep all your equipment tidy and safe. These cabinets are solid but attractive pieces of furniture, 91.5cm wide, 42.5 cm deep and 82.5 cm high (36 by 16.75 by 32.5 inches). A sliding shelf locks in position and slides away after use and a storage shelf provides space for cassettes, books and other essential articles.

Inspiration

The idea of this competition came from I Heath of Merseyside, who suggests the following revamped titles to well known songs and films:

Software OVER the Spectrum	Judy Garland
BRIGHT Is	Art Garfunkel
INK 0 is ink 0	Rolling Stones
You need AND s	Max Bygraves
The NEXT time: MOVE it: The 12th of PAUSE 0	Cliff
A LISTful of D$	a favourite of the golden SCREEN$.

To enter, all we want is your version of a computer age song, film or television program sent on the back of a sealed envelope or postcard with your name and address.

As humour, especially puns, varies from person to person the winner will be the one which appeals most to the Editor (that's me). A surprise parcel is on its way to Mr I Heath as appreciation of his idea for this competition.

Marcol Cabinets are to be found at PO Box 69, High Street, Southampton SO9 7EQ.

The rules

- This competition is open to all UK and Northern Ireland readers of ZX Computing except employees of Argus Specialist Publications Ltd, their printers and distributors and employees of Marcol Cabinets. This restriction also applies to employee's families and agents of the companies, or anyone else associated with the competition.
- As long as the correct coupon is used for each entry, there is no limit to the number of entries from each individual.
- All entries must be postmarked before May 31 1984. The first prize will be awarded to the first correct entry picked at random.
- The winner will be picked by the Editor of *ZX Computing*. No correspondence will be entered into with regard to the results, and it is a condition of entry that the Editor's decision is accepted as final.
- The winner will be notified by post and the results of the competition will be published in a future issue of *ZX Computing*.

Address your entries to:

ZX Computing, Write a Pun
1 Golden Square
London W1R 3AB.



Results

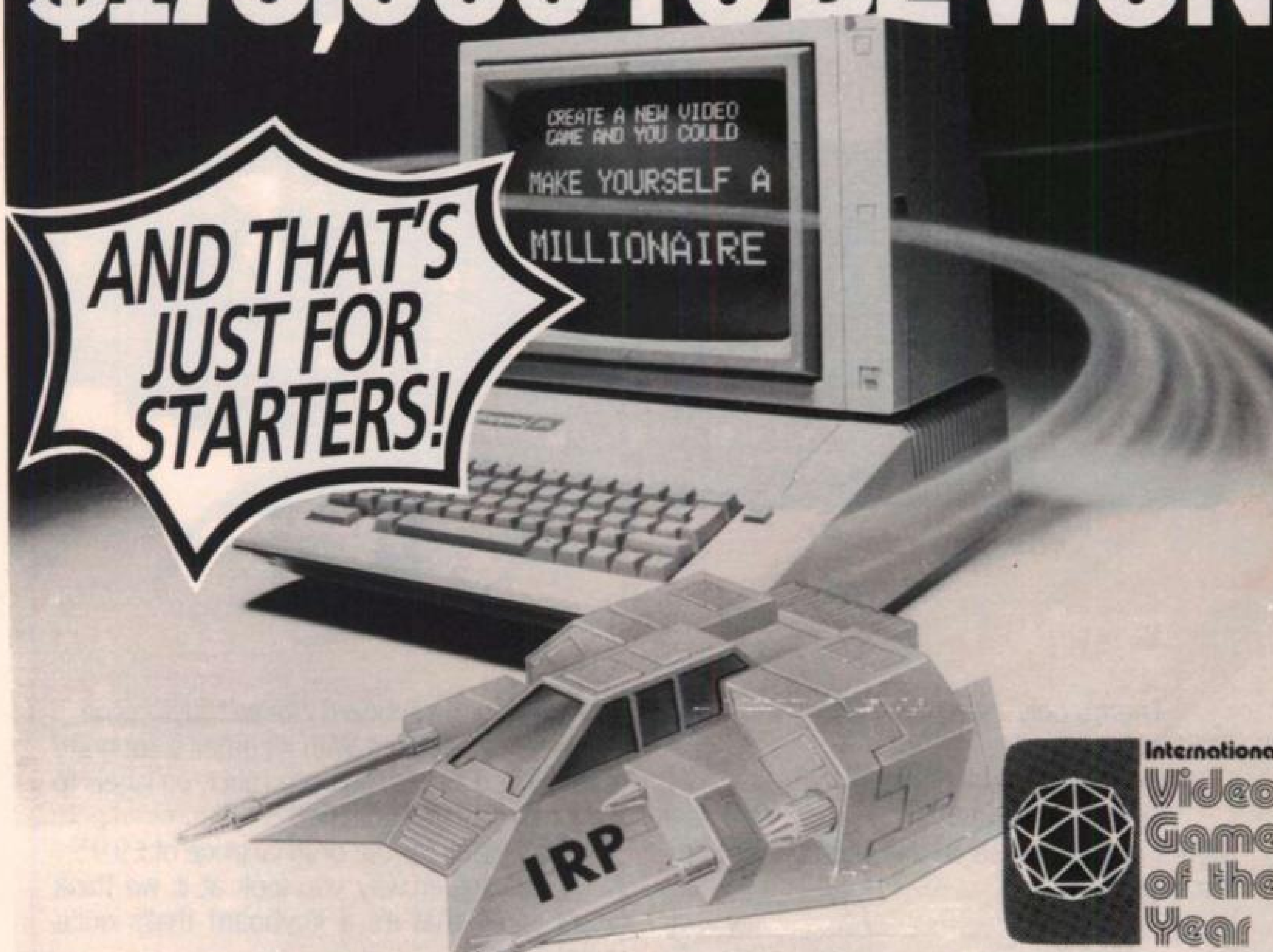
Many thanks for all the entries we received to the Wordsquare competition in the Dec/-Jan issue of ZX Computing. We had literally thousands of entries and most of them were correct. The answer to the puzzle was 17 software titles, including that well known text and graphic adventure game, the Horbit!

Congratulations to Robert Stobie of Bolton, M Gell of Clacton-on-Sea, M Radley of St Andrews, Jeremy Howden of Worcester, B Hobson of Huddersfield and Stephen Moran of Carterton who were the first six correct entries picked from the hat. Each of the lucky winners will receive a unique *ZX Computing* and Visions Software Factory T-shirt and seven super Visions software packages for the ZX Spectrum.

Thank you to everyone who entered the competition — better luck next time!

THE INTERNATIONAL VIDEO GAME OF THE YEAR COMPETITION HERALDS THE "NEW AGE" IN VIDEO/COMPUTER GAMES

$175,000 TO BE WON



Create a brilliant, new video game and you could be on your way to becoming a millionaire. This fantastic competition, organised by I.R.P. (The International Register of Independent Computer Programmers Ltd) and the famous Mark McCormack International Management Group, offers programmers and inventors the opportunity of a life time. There are huge, immediate cash prizes and the on-going revenue of 10% of the sales of all games to distributors throughout the world, plus the chance to appear on an international TV show. Your skill and imagination could bring you fame and fortune!

$100,000 FIRST PRIZE! PLUS FIVE $15,000 RUNNER-UP PRIZES!

Devise a totally original new video game in one of these categories: SPORTS, SIMULATORS, ARCADE, STRATEGY, ADVENTURE/FANTASY or a special section which covers programmes that are not necessarily games but have outstanding Educational or Entertainment merit. We'll also be announcing a number of 'MERIT' awards which will be entitled to carry the message 'An International Video Game of the Year MERIT AWARD' on their retail packaging. It's a great challenge. And the rewards, both financially and in terms of prestige, are tremendous. This is the most exciting competition ever for creative computer and video enthusiasts.

YOU'RE A TV STAR TOO!

All six winning games and their inventors will be featured on an internationally distributed, spectacular TV special. That's going to make your name!

HOW TO ENTER

Just send in your game, or games, programmed on cassette for any popular home computer. Use the coupon, today, and we'll send you all the facts you need.

CLOSING DATE FOR ENTRIES IS 31st MAY 1984

To: IRP Limited, Pinewood Film Studios, Iver, Bucks, England.

Name ....

Address ....

ZXC1

A NEW, IMPROVED ZX81 KEYBOARD AT THE SAME OLD PRICE. £9.95.



There's only one thing wrong with the ZX81. Its keyboard.

Or rather its lack of one.

Since it's flat your fingers don't feel as if there's any response to the pressure put on the keys.



In other words, you're not quite sure which keys you've pressed until the screen actually tells you.

Our new, improved push button keyboard changes all that.

It matches the ZX81 perfectly. And the keys give a real calculator-type feel.

To set it up all you have to do is peel off the adhesive backing and stick it on top of the ZX81 touchpad.

Because no tampering or soldering is involved the guarantee is not affected. And it will last for up to 3½ million operations.

But our keyboard doesn't just come loaded with features. With it comes a separate overlay and a set of coloured stick-on labels to make game playing easier.

It's yours for the original price of £9.95.

Whichever way you look at it, we think you'll agree that it's a keyboard that's quite outstanding.

Orders to Filesixty Ltd., FREEPOST, London W9 2BR.
Cheques/PO made payable to Filesixty Ltd.
Please send me ______ (qty.) Keyboards at £9.95 each (including VAT and P&P).

Total £ ______

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Address ______

ZX 3/84

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Maniac Munchers

A fruit munching menace from Suffolk programmer, M Parrish.

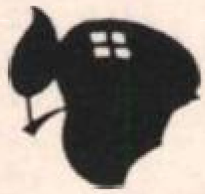


OK pardners, down here in Suffolk we have a problem with a weird little rat-like beastie who eats our fruit and is pretty fatal to touch. Our solution is simple, shoot the varmints! But, could you live here?

Well there's only one way to find out, type in this program and try for yourself. We give you four lives to start and you will lose one if you collide with a muncher or if a muncher scores 1000. You score 10 points for each muncher you destroy and 10 points for each fruit you shoot. On clearing a complete stage you are awarded a bonus of 60 points.

The muncher's task is much more difficult, at least in the early stages, so he gets 50 points for each fruit eaten, 50 point for getting past you and 100 points if he touches you.

Can you survive all four stages? Each is more difficult than the last and every 1000 you score will restart the sequence. To move your man use keys 6 and 7 for down and up and 0 to fire.



Program construction

Here follows a guide to the construction of Maniac Munchers.

4-48	GO SUB for graphics/GO TO intro and initialise variables.
49-881	Main loop.
882-900	Bitten! Lose a life, check for end of game.
901-915	Muncher gets past man.
969-1200	Graphics DATA.
1292-1294	Turns CAPS SHIFT on.
1290-1450	Intro, set variables and screen.
1499-1535	Resets variables and stage after scoring 1000.
1980-2114	Sets up four random fruits and updates screen.
2499-3600	Increase difficulty by reducing time to aim gun.
4199-4240	End game routine.
4885-5010	Shoot muncher routine.
8888-9030	Check for hit on fruit or muncher.



```
  1 REM ***********************
      *  MANIAC MUNCHERS    *
      *          BY         *
      *  MICHAEL  PARRISH   *
      ***********************
  4 GO SUB 970
  6 GO TO 1250
  7 REM ************************
  8 REM * LETTERS IN QUOTES    *
      * THAT ARE NOT WORDS   *
      * ARE ENTERED IN       *
      * GRAPHIC MODE.        *
      ************************
 10 LET j=29: LET v=28: LET a=1
8: LET b=3
 29 GO TO 45
 31 REM SCORE*******************
 32 PRINT AT 0,0; PAPER 0; INK
7;"CD SCORE ";i;AT 0,13; PAPER 0
; INK 7;a$;"'s SCORE ";r
 33 RETURN
 35 REM STAGE (1)**************
 40 PRINT AT 10,20; INK 2; FLAS
H 1;"STAGE 1": GO SUB 2500
 42 PRINT AT 10,20;"         ";AT
 16,0;" ";AT 17,0;" "
 43 RETURN
 45 GO SUB 31
 48 GO SUB 40
 49 REM MAIN ROUTINE **********
 50 LET g=INT (RND*20)
 55 IF g=0 THEN  LET g=15
 56 IF g=1 THEN  LET g=2
 60 FOR h=j TO 0 STEP -1
 63 IF g=p AND h=6 THEN  LET i=
i+50: GO SUB 2090
```



```
  65 IF g=e AND h=8 THEN  LET i=
i+50: GO SUB 2100
  70 IF g=z AND h=12 THEN  LET i
=i+50: GO SUB 1980
  71 IF g=s AND h=10 THEN  LET i
=i+50: GO SUB 2050
  80 PRINT AT g,h; INK 0;"CD ":
BEEP .009,40: BEEP .009,20: PRIN
T AT g,h; INK 0;"GE "
 150 IF h=2 THEN  LET i=i+50: GO
 TO 902
 185 IF r>=m AND r<x THEN  LET j
=22: LET r=r+60: GO TO 2899
 187 IF r>=k AND r<u THEN  LET j
=16: LET r=r+60: GO TO 3300
 188 IF r>=q AND r<n THEN  LET j
=10: LET r=r+60: GO TO 3500
 190 IF r>=d THEN  GO TO 1500
 195 IF i>=1000 AND i<=1050 THEN
  LET i=i+100: LET t=t-1: BEEP 1
,0: BEEP 1,10: BEEP 1,-10: GO TO
 888
 200 IF INKEY$="0" THEN  GO SUB
8997
 210 IF g=a AND h=b+1 THEN  LET
i=i+100: LET t=t-1: GO TO 882
 211 IF g=a+1 AND h=b+1 THEN  LE
T i=i+100: LET t=t-1: GO TO 882
 255 LET a=a+(INKEY$="6")-(INKEY
$="7")
 275 IF a<2 THEN  LET a=2
 310 IF a>19 THEN  LET a=19
 320 IF a<1 THEN  LET a=1
 350 PRINT AT a,b; INK 1;"M";AT
a+1,b;"Q";AT a-1,b;" ";AT a+2,b;
" "
 880 NEXT h
 881 GO TO 50
 882 REM MUNCHER HITS TO YOU****
 883 PRINT AT a,b; INK 2; FLASH
1;"M";AT a+1,b; INK 2; FLASH 1;"
Q"
 884 FOR l=30 TO -20 STEP -3
 885 BEEP .009,l: NEXT l
 888 GO SUB 30
 889 IF t=3 THEN  PRINT AT 12,0;
" ";AT 13,0;" "
 891 IF t=2 THEN  PRINT AT 8,0;"
 ";AT 9,0;" "
 893 IF t=1 THEN  PRINT AT 4,0;"
 ";AT 5,0;" "
 895 IF t=0 THEN  GO TO 4200
 896 PRINT AT g,h;"  "
 900 GO TO 50
 901 REM MUNCHER GETS FRUIT*****
 902 FOR l=45 TO 0 STEP -3
 903 BEEP .009,l: NEXT l
 905 PRINT AT g,h;"  "
 910 GO SUB 30
 915 GO TO 50
 969 REM  DATA FOR GRAPHICS*****
*
 970 FOR u=0 TO 143
 980 READ a: POKE USR "a"+u,a
 990 NEXT u
1000 DATA 126,126,126,60,126,102
,198,231
1100 DATA 0,0,0,0,16,28,255,224
1104 DATA 40,127,255,15,31,63,10
0,8
1110 DATA 1,226,244,248,240,240,
32,64
1120 DATA 0,224,240,255,240,240,
32,16
1130 DATA 0,0,40,127,255,BIN 101
01111,255,127
1141 DATA 40,127,255,255,255,127
,4,2
1150 DATA 4,107,107,28,62,62,62,
28
1155 DATA 12,8,110,255,255,126,6
0,24
1156 DATA 0,0,0,224,240,248,244,
226
1157 DATA 0,12,4,15,15,31,47,71
1159 DATA 0,96,32,254,255,BIN 11
110101,255,254
1160 DATA 60,255,90,60,36,255,18
9,189
1161 DATA 1,30,58,118,238,220,24
8,112
1165 DATA 8,8,24,36,102,255,255,
102
1170 DATA 0,0,0,0,0,0,204,0
1175 DATA 189,189,60,102,102,102
,36,231
1180 DATA 60,255,58,63,60,62,127
,127
1200 RETURN
1290 REM INTRODUCTION***********
1291 BORDER 7: PAPER 7: CLS
1292 IF INT (PEEK 23658/8)=2*INT
 (INT (PEEK 23658/8)/2) THEN  GO
 TO 1294
1293 GO TO 1295
1294 POKE 23658,PEEK 23658+8
1295 PRINT AT 10,0;"
DO YOU WISH TO HAVE INSTRUCTIONS
           Y / N"
1296 IF INKEY$="N" THEN  CLEAR :
 GO TO 1390
1297 IF INKEY$="Y" THEN  CLEAR :
 GO TO 1299
1298 GO TO 1296
1299 PRINT AT 0,0; INK 2;"
********************************
";AT 9,0; INK 2;"              *
*******************************"
```

```
;AT 18,0; INK 2; "
******************************
"
1300 PRINT AT 2,0; INK 1;
"Stop the MUNCHERS eating your
 fruit You have four lives you
 will lose one of these for ever
y1000 the MUNCHER score's, You
 will also lose one live if you
 collide with the MUNCHER:"
1310 PRINT AT 11,0; INK 1;
"There are four stage's each mor
edifficult than the last
 The stage's will repeat with
 every 1000 points you score:"
1349 PRINT AT 20,5; INK 0; FLASH
 1;"PRESS 'C' TO CONTINUE"
1350 PAUSE 50
1351 PRINT AT 20,0; INK 1;"M";AT
 21,0; INK 1;"Q": PAUSE 50: PRIN
T AT 20,0; INK 1;"R";AT 20,1; IN
K 1;"B";AT 21,0; INK 1;"A";AT 20
,2;"PPPPPPPPPPPPPPPPPPPPPPPPPPPP
": BEEP .09,0: BEEP .09,10
1353 PRINT AT 20,1;"
                  ";AT 20,0; INK
1;"M";AT 21,0; INK 1;"Q": PAUSE
20
1360 IF INKEY$="C" THEN PRINT A
T 20,0;" ";AT 21,0;" ": GO TO 13
70
1362 GO TO 1349
1370 PRINT AT 2,0; INK 0;    "Y
ou will score '10' points for e
ach MUNCHER you destroy '10' p
oints if you shoot one of the f
our fruits that will appear at r
andom and a bonus of '60' for e
ach stage you complete:"
1375 PRINT AT 11,0; INK 0; "
As in the early stage's the
MUNCHERS task is considerabley
more difficult than your's he
score's '50' for each fruit '50'
if he get's past you and '100'
if he hit's you"
1376 PRINT AT 21,5; INK 2; FLASH
 1;"  PRESS 'P' TO PLAY "
1377 FOR a=29 TO 0 STEP -1
1378 PRINT AT 21,a;"CD ": BEEP .
09,26: PRINT AT 21,a;"GE ": BEEP
 .09,30
1384 IF INKEY$="P" THEN GO TO 1
390
1385 NEXT a
1386 PRINT AT 21,0;" "
1388 GO TO 1376
1390 BORDER 4: PAPER 6: INK 1: C
LS
1391 FOR a=0 TO 21 STEP 1
1392 PRINT AT a,0; INK 0; "
GOOD LUCK              GOOD LUCK
": BEEP .03,a
1393 NEXT a
1394 FOR a=21 TO 0 STEP -1
1395 PRINT AT a,0;"
                   ": BEEP .03,a
1396 NEXT a
1397 PRINT AT 0,0; INK 7; PAPER
0;"CD
 RB";AT 10,0; INK 0; PAPER 6; "
   PLEASE ENTER YOUR NAME";AT 3
,0;" UP...7     DOWN...6    FIRE.
..0 "
1398 INPUT a$
1399 PRINT AT 10,0;"
                  ";AT 3,0;"
                               "
1400 LET d=1000: LET m=260: LET
x=311: LET k=500: LET u=551: LET
 q=800: LET n=851: LET i=0: LET
r=0: LET t=4
1401 PRINT AT 4,0;"M";AT 5,0;"Q"
;AT 8,0;"M";AT 9,0;"Q";AT 12,0;"
M";AT 13,0;"Q";AT 16,0;"M";AT 17
,0;"Q"
1402 FOR a=1 TO 21 STEP 2
1403 PRINT AT a,1; INK 2;"I"
1405 NEXT a
1407 FOR a=2 TO 20 STEP 2
1409 PRINT AT a,1; INK 4;"H"
1410 NEXT a
1414 GO SUB 2090
1415 GO SUB 2000
1420 GO SUB 2050
1425 GO SUB 2100
1430 FOR a=0 TO 21 STEP 1
1450 GO TO 10
1499 REM RE-set stage's*********
1500 LET m=m+1000: LET x=x+1000:
 LET k=k+1000: LET u=u+1000
1510 LET d=d+1000: LET q=q+1000:
 LET n=n+1000
1513 FOR w=21 TO 1 STEP -1
1515 PRINT AT w,14; PAPER 6;"
                  ": BEEP .03,w
1520 NEXT w
1532 PRINT AT g,h;"  ";AT a,b;"
";AT a+1,b;" "
1535 GO TO 10
1980 REM  RND FRUIT************
1991 GO SUB 30
2000 LET z=INT (RND*19)
2001 BEEP .01,30
2005 IF z=0 THEN  LET z=6
2006 IF z=1 THEN  LET z=15
2010 PRINT AT z,12; INK 1;"O"
2020 RETURN
```

```
2051 GO SUB 30
2060 LET s=INT (RND*19)
2065 BEEP .01,30
2070 IF s=0 THEN  LET s=6
2075 IF s=1 THEN  LET s=18
2080 PRINT AT s,10; INK 4;"H"
2085 RETURN
2091 GO SUB 30
2092 LET p=INT (RND*19)
2093 BEEP .01,30
2094 IF p=0 THEN  LET p=7
2095 IF p=1 THEN  LET p=13
2096 PRINT AT p,6; INK 0;"N"
2097 RETURN
2102 GO SUB 30
2104 LET e=INT (RND*19)
2106 BEEP .01,30
2108 IF e=0 THEN  LET e=6
2110 IF e=1 THEN  LET e=18
2112 PRINT AT e,8; INK 2;"I"
2114 RETURN
2499 REM  BEEP  STAGE GHANGE****
*
2500 FOR O=-30 TO 50 STEP 2
2510 BEEP .05,O
2520 NEXT O
2530 RETURN
2899 REM STAGE (2)*************
2900 PRINT AT 21,10; INK 2; FLAS
H 1;"STAGE 2"
2902 GO SUB 30
2930 GO SUB 2500
2940 PRINT AT 21,10;"       "
3000 PRINT AT g,h;"  "
3001 LET v=20
3002 FOR w=255 TO 200 STEP -1
3010 PLOT w,0: INK 4: DRAW 0,167
: BEEP .009,-20
3020  NEXT w
3030 GO TO 50
3300 REM STAGE (3)*************
3302 GO SUB 30
3305 PRINT AT 21,10; INK 2; FLAS
H 1;"STAGE 3"
3306 GO SUB 2500
3309 PRINT AT 21,10;"       "
3310 PRINT AT g,h;"  "
3320 LET v=14
3330 FOR w=200 TO 152 STEP -1
3340 PLOT w,0: INK 4: DRAW 0,167
: BEEP .009,-20
3345 NEXT w
3350 GO TO 50
3500 REM STAGE (4)*************
3510 GO SUB 30
3520 PRINT AT 21,10; INK 2; FLAS
H 1;"STAGE 4"
3530 GO SUB 2500
3540 PRINT AT 21,10;"       "
3550 PRINT AT g,h;"  "
3560 LET v=10
3570 FOR w=155 TO 120 STEP -1
3580 PLOT w,0: INK 4: DRAW 0,167
: BEEP .009,-20
3590 NEXT w
3600 GO TO 50
4199 REM YOU LOSE ************
4200 BORDER 4: PAPER 6: INK 0: C
LS
4205 FOR f=0 TO -30 STEP -1
4206 BEEP .01,f
4207 NEXT f
4208 BEEP 1,0: BEEP 1,-30: BEEP
1,0: BEEP 2,-30
4210 PRINT AT 9,0;" HARD LUCK ";
a$;" DO YOU "
4213 PRINT AT 12,0;" WHICH TO HA
VE ANOTHER GO...'G' OR NOT.....
..............'N'"
4215 PRINT AT 0,0; PAPER 0;"
                    "
4218 GO SUB 30
4220 IF INKEY$="G" THEN  GO TO 6
4230 IF INKEY$="N" THEN  STOP
4240 GO TO 4220
4885 REM YOU SHOOT MUNCHER*****
4888 BEEP .009,20
4999 FOR l=0 TO 48 STEP 6
5000 PRINT AT g,h; INK 2;"KL": B
EEP .009,l
5005 NEXT l
5006 PRINT AT g,h;"  "
5008 PAUSE 50: GO SUB 30
5009 PRINT AT a,b+1;"  "
5010 GO TO 50
8888 REM YOU FIRE*************
8997 PRINT AT g,h; INK 0;"FJ"
8998 PRINT AT a,b; INK 1;"RB";AT
 a+1,b; INK 1;"A"
9000 LET c=b+2
9002 FOR c=b+2 TO v STEP 5
9006 IF a=p THEN  LET r=r+10: GO
 SUB 2090
9007 IF a=e THEN  LET r=r+10: GO
 SUB 2100
9008 IF a=s THEN  LET r=r+10: GO
 SUB 2050
9009 IF a=z THEN  LET r=r+10: GO
 SUB 1990
9010 PRINT AT a,c; INK 0;"PPPPP"
: BEEP .009,60
9021 PRINT AT a,c;"     "
9022 NEXT c
9023 PRINT AT a,b+1;"  "
9025 IF a=g THEN  PRINT AT a,b+1
; INK 1;"B": LET r=r+10: GO TO 4
500
9030 RETURN
```

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All change

Undergo a character change with the aid of Paul Matthews of Avon.

There are many occasions when an alternative set of characters is a very useful option — professional titles and Gothic style lettering for home programmed adventure games to name but two!

This program will allow you to redefine the entire character set and User Defined Graphics and to look at any RAM or ROM character at eight times the normal size. A simple machine code routine is used from within the program to copy the ROM character set into RAM. Notice that the program takes into account the memory size and makes appropriate RAMTOP changes with the CLEAR command.

Paul has made use of REM statements to explain the various sections of the program, you may leave these out of course, especially if working with 16K, but they are valuable when trying to debug any typing errors.

This is a good example of careful programming (although no doubt someone will find a way to crash it if they try) and Paul has taken great care to make it as idiot proof as possible. Should you accidentally (or otherwise) break the program, it is quite safe to RUN it to restart and you will not lose your redefined characters. When you are using the program be careful not to press '1' from the main menu in error, as this *will* wipe out all your special characters.

One very useful feature is that when using these redefined characters, SCREEN$ will recognise them. If you use some as UDGs then, unlike the normal character system, SCREEN$ can be used to detect collisions etc.

Variables used

r,q	Start of RAM character set.
i$	INKEY$ check.
q$	Titles.
a$	INPUT check.
x,y,z	Used in enlarging characters.
a	Value of input, etc.
w,c	Data for drawing/inputting characters.
f,b,g	FOR-NEXT variables.

```
 10 LET q= PEEK 23675+256* PEEK
 23676: LET q=q-801
 20 POKE 23609,20
 40 CLEAR q
 50 LET q= PEEK 23730+256* PEEK
 23731: LET q=q+31
 60 GO SUB 9000: GO SUB 9200
 70 GO SUB 140: IF  PEEK 23681
<> 1 THEN  LET i$="1": GO TO 520
 80 GO TO 400
 90 STOP
 100 POKE 23606,0: POKE 23607,60
 110 RETURN
 140 LET r=q/256: POKE 23606,(r-
INT r)*256: POKE 23607, INT r-1
 150 RETURN
 390 REM #### MENU ####
 400 BORDER 7: PAPER 7: INK 2: C
LS : GO SUB 100
 410 PRINT  BRIGHT 1; INVERSE 1;
 INK 1; TAB 7;"CHARACTER CHANGE"
; TAB 31;" "; TAB 5;"© 1983 Paul
 Matthews"; TAB 31;" "
 420 PRINT ' TAB 14; INK 1;"MENU
"
 430 PRINT ' TAB 10; INK 3;"CHAR
ACTER SET"
 440 PRINT '"1 Reset whole chara
cter set."'"2 View a ROM charact
er."'"3 View a RAM character."
 450 PRINT "4 Change a character
."'"5 Reset just one character."
 460 PRINT ' INK 3; TAB 5;"USER
DEFINABLE GRAPHICS"
 470 PRINT '"6 View a UDG."'"7 C
hange a UDG."
 480 PRINT  INK 3;'"8 A Complete
 view."'"9 LOAD/SAVE Routines."
 490 INK 0: PRINT #0; BRIGHT 1;
INK 7; PAPER 4; TAB 5;"Input you
r choice now..."; TAB 31;" "
 500 LET i$= INKEY$ : IF i$< CHR
$ 49 OR i$> CHR$ 57 THEN  GO TO
500
 520 BEEP .1, CODE i$-64
 530 IF i$="1" THEN  LET a= USR
(q-30): POKE 23681,1: GO TO 400
 540 IF i$="2" OR i$>"5" THEN  G
O SUB 100: GO TO 560
```

ALL CHANGE

ALL CHANGE ALL

```
550 GO SUB 140
560 CLS : LET q$=("CHARACTER SE
T" AND i$<"6")+("USER DEFINABLE
GRAPHICS" AND (i$="6" OR i$="7")
)+("A COMPLETE VIEW" AND i$="8")
+("LOAD/SAVE ROUTINES" AND i$="9
")
570 PRINT  INK 3; AT 0,15-( LEN
q$/2);q$''
580 GO SUB (( VAL i$)*200+600)
600 PRINT #0; INK 1;"Press ENTE
R for Menu, else same."
620 IF  INKEY$ ="" THEN  GO TO
620
630 IF  INKEY$ = CHR$ 13 THEN
BEEP .1,12: GO TO 400
650 GO TO 520
690 STOP
700 REM ###DRAW A BOX###
710 PLOT 128,128
720 INK 1: DRAW 64,0: DRAW 0,-6
4: DRAW -64,0: DRAW 0,64
740 INK 0: RETURN
800 REM ###ENLARGE CHARACTOR###
810 LET z=w: LET y=128
820 INK 1: PRINT  TAB 16;
830 LET x= INT (z/y): PRINT  CH
R$ 164;: IF x=1 THEN  PRINT  CHR
$ 8;"█";: LET z=z-y
850 LET y=y/2: IF y<1 THEN  INK
0: BRIGHT 0: RETURN
860 GO TO 830
1000 REM ##LOOK AT CHARACTERS##
1010 INPUT "View Which ROM Chara
cter? ";a$: LET a= CODE a$: IF a
<32 OR a>127 OR  LEN a$ <> 1 THE
N  GO TO 1010
1020 LET a=(a-32)*8+15616
1030 GO SUB 700
1040 FOR f=1 TO 16: PRINT a$;" "
;: NEXT f
1060 PRINT ''"Code:"
1070 FOR f=a TO a+7: LET w= PEEK
 f: PRINT 'f;"=";w;: GO SUB 800:
 NEXT f
1080 PRINT '': FOR f=1 TO 16: PR
INT a$;" ";: NEXT f
1090 RETURN
1200 REM ##AS 1000 BUT IN RAM##
1210 INPUT "View Which RAM Chara
cter? ";a$: LET a= CODE a$: IF a
<32 OR a>127 OR  LEN a$ <> 1 THE
N  GO TO 1210
1220 LET a=(a-32)*8+q
1230 GO TO 1030
1400 REM ###CHANGE CHARACTER###
1420 INPUT "Character to be chan
ged..."; a$
1430 LET a= CODE a$: IF a>127 OR
 a<32 OR  LEN a$>1 THEN  GO TO 1
420
1440 PLOT 128,152: GO SUB 720: L
ET c=(a-32)*8+q
1460 FOR f=c TO c+7: LET w= PEEK
 f: PRINT 'w;: PRINT  TAB 10;" "
 AND f/2= INT (f/2);a$;: GO SUB
800: NEXT f
1480 PLOT 128,80: GO SUB 720
1500 PRINT  INK 3;'"New code:";:
 FOR f=0 TO 7
1510 INK 2: INPUT w: IF w<0 OR w
>255 OR w <>  INT w THEN  GO TO
1510
1520 POKE c+f,w: PRINT 'w; TAB 1
0;" " AND f/2= INT (f/2);a$;: GO
 SUB 800
1530 NEXT f
1540 PRINT '': FOR f=1 TO 16: PR
INT  CHR$ a;" ";: NEXT f
1550 RETURN
1600 REM ##RESET A CHARACTER##
1620 INPUT "Character to be rese
t...";a$
1630 LET a= CODE a$: IF a>127 OR
 a<32 OR  LEN a$>1 THEN  GO TO 1
620
1640 PLOT 128,152: GO SUB 720: L
ET c=(a-32)*8+q: LET a=(a-32)*8+
15616
1650 FOR b=1 TO 2
1660 FOR f=0 TO 7: PRINT ';: LET
 w= PEEK (c+f): IF f=0 OR f=7 TH
EN  PRINT  TAB 0;: FOR g=1 TO 5:
 PRINT a$;" ";: NEXT g
1670 GO SUB 800: NEXT f
1680 IF b=1 THEN  FOR g=0 TO 7:
POKE (g+c), PEEK (g+a): NEXT g:
PRINT  AT 7,2;"WAS:"; AT 10,0: P
LOT 128,80: GO SUB 720
1690 NEXT b: PRINT  AT 16,2;"NOW
:"
1700 RETURN
1800 REM ###LOOK AT UDG###
1810 INPUT "UDG to be viewed..."
;a$: LET a= CODE a$: LET a=a+(79
 AND a>64 AND a<91)+(47 AND a>96
 AND a<123): IF a<144 OR a>164 O
R  LEN a$ <> 1 THEN  GO TO 1810
1820 GO SUB 700: FOR f=1 TO 16:
```

all change CHANGE

ALLCHANGE

```
PRINT  CHR$ a;" ";: NEXT f
1830 PRINT '''UDG Code:"
1840 LET c= USR a$
1850 FOR f=0 TO 7: LET w= PEEK (
f+c): PRINT 'w;: GO SUB 800
1860 NEXT f: PRINT ''
1870 FOR f=1 TO 16: PRINT  CHR$
a;" ";: NEXT f
1880 RETURN
2000 REM ###CHANGE UDG###
2010 INPUT "UDG to be changed.."
;a$; LET a= CODE a$: LET a=a+(79
 AND a>64 AND a<91)+(47 AND a>96
 AND a<123): IF a<144 OR a>163 T
HEN  GO TO 2010
2020 LET c= USR a$(1): PLOT 128,
152: GO SUB 720: FOR f=0 TO 7
2030 LET w= PEEK (f+c): PRINT 'w
; TAB 10;" " AND f/2= INT (f/2);
 CHR$ a;: GO SUB 800: NEXT f
2040 PRINT  INK 2;'"New UDG Code
:";
2050 PLOT 128,80: GO SUB 720
2060 FOR f=0 TO 7: INK 2: INPUT
w: IF w<0 OR w>255 OR w <>  INT
w THEN  GO TO 2060
2070 POKE (f+c),w: PRINT 'w; TAB
 10;" " AND f/2= INT (f/2); CHR$
 a;: GO SUB 800: NEXT f
2080 PRINT '': FOR f=1 TO 16: PR
INT  CHR$ a;" ";: NEXT f
2090 RETURN
2200 REM ###A COMPLETE VIEW###
2210 PRINT "ROM CHARACTER SET:";
2220 INK 0: FOR g=1 TO 2
2240 FOR b=1 TO 6: PRINT : FOR f
=0 TO 14: PRINT " " AND (b/2= IN
T (b/2) AND f=0); CHR$ ((b*15)+f
+17);" ";: NEXT f: NEXT b
2250 PRINT  TAB 10;: FOR f=122 T
O 127: PRINT  CHR$ f;" ";: NEXT
f
2260 IF g=1 THEN  INK 2: PRINT '
"RAM CHARACTER SET:";: GO SUB 14
0
2270 NEXT g
2280 GO SUB 100
2290 INK 3: PRINT ''"USER DEFINAB
LE GRAPTICS:": FOR f=144 TO 164
2300 PRINT  CHR$ f;" "; CHR$ 23+
 CHR$ 11+ CHR$ 0 AND f=159;
2310 NEXT f
2330 RETURN
2400 REM ##LOAD/SAVE ROUTINES##
2410 PRINT  INK 1;'"A..Save New
Character set."'''"B..Save User D
efinable Graphics."'''"C..Save Th
is Program."
2430 PRINT  INK 2;'''"D..Load a C
haracter Set."'''"E..Load User De
finable Graphics."'''"F..Load Any
 Program."
2450 LET a$= INKEY$ : LET a= COD
E a$: LET a=a-(32 AND a>96 AND a
<103): IF a<65 OR a>70 THEN  GO
TO 2450
2460 LET b=3+(1 AND a>67)+((a-65
)*2): PRINT  AT b,0; INK 8; FLAS
H 1; OVER 1; TAB 7
2470 GO SUB (3000+((a-65)*100))
2480 IF  INKEY$ ="n" OR  INKEY$
="N" THEN  GO TO 2480
2490 RETURN
3000 SAVE "Char. Set" CODE q,768
3020 PRINT  AT 20,10;"VERIFY ? (
Y/N)": LET a$= INKEY$
3030 IF a$="n" THEN  GO TO 3080
3040 IF a$ <> "y" THEN  GO TO 30
20
3050 PRINT  AT 20,2;"Rewind Tape
 and Press Play."; AT 19,0: IF a
 <> 67 THEN  VERIFY "" CODE
3060 IF a=67 THEN  VERIFY ""
3080 RETURN
3100 SAVE "U.D.G.'s" CODE (q+769
),168
3120 GO TO 3020
3200 LET a$="y": SAVE "Character
." LINE 1
3220 GO TO 3020
3300 PRINT  AT 18,1;"Connect ear
 plug & start tape.";
3310 LOAD "" CODE q
3330 RETURN
3400 PRINT  AT 18,1;"Connect ear
 plug & start tape.";
3410 LOAD "" CODE (q+769)
3430 RETURN
3500 PRINT  AT 18,12; FLASH 1;"B
YE BYE."
3510 PRINT #1;"Press any key & t
hen start tape."
3520 LOAD "": RUN
8999 STOP
9000 REM ###SET UP UDG's###
9010 RESTORE 9000: FOR f=0 TO 7:
 READ a: POKE  USR "u"+f,a
9020 NEXT f: RETURN
9030 DATA 128,128,128,128,128,12
8,128,255
9200 RESTORE 9200: LET r=q/256
9210 FOR f=(q-30) TO (q-30)+11:
READ a: POKE f,a: NEXT f: RETURN
9220 DATA 17,(r- INT r)*256, INT
 r,33,0,61,1,0,3,237,176,201
9990 STOP
9999 GO SUB 100: POKE 23609,0
```

The 1K Corral



1K wonders to amuse and confuse!

We continue with our policy of providing something for everyone with this selection of 1K programs. Although memory limitation prevents sophisticated error trapping and user friendliness, these programs show what can be achieved in 1K using BASIC.

For the programmer with more RAM at his disposal they provide skeleton programs for development and they are good for the beginner as exercises, usually involving efficient, tight programming in order to RUN in 1K.

Teletext
D Wishart

This is a routine which is intended to be incorporated into a larger program, but it will run on its own. It gives a printout similar to that of a teletext printer and can be used to animate instructions or information. The amount of memory used depends on the length of Z$ but, for a rough guide, the printed program will just fit into 1K without the REM statements.

The principles it works on is quite simple. It prints out the characters of the string Z$ one by one, unless the character is a dollar sign, in which case the screen is SCROLLed twice, and a new line is started. When typing in your own Z$, you must remember to finish each line with a dollar sign or the program will terminate with error code 5.

You can rename the string and change the character which ends the line. If performing the latter, you must change the 13 in line 20 to the code of the new character.

Unfortunately, after SCROLLing the screen it takes a long time to clear, so it is advisable to go into fast before executing a CLS. Note that after the word 'enhance' in line 5, there are two spaces.

```
   1 REM TELETEXT
   5 LET Z$="                    TELETE
XT$$ THIS IS A ROUTINE WHICH GI
VES A$ PRINTOUT SIMILAR  TO TEL
ETEXT.IT$CAN BE USED TO ENHANCE
  THE LOOKS$ OF INSTRUCTIONS E.
T.C."
   6 LET Z$=Z$+"$$                T
HE END$$"
  10 SCROLL
  15 FOR I=1 TO LEN Z$
  20 IF CODE Z$(I)=13 THEN GOTO
50
  25 PRINT Z$(I);
  30 NEXT I
  35 STOP
  50 SCROLL
  55 SCROLL
  60 NEXT I
  70 REM BY D. WISHART
```

Air strike
Barry Curtis

Scramble, scramble, you are in the suicidal position of piloting your missile into the helicopters (black squares). Using auto control keys 6 to go down and 7 to go up you have one minute in which to succeed. Good luck Biggles!



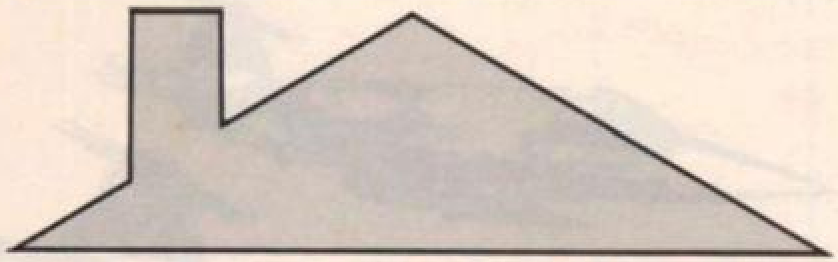
```
  10 LET A=0
  20 LET B=10
  30 LET C=A
  40 LET D=B
  50 LET S=A
  55 LET E=430
  60 CLS
  70 IF A=32 THEN  LET A=0
  80 IF B=21 THEN  LET B=0
  85 IF C=21 THEN  LET C=0
  90 PRINT AT B,A;">>-->"
 100 PRINT AT C,D;"■"
 110 IF C<>B OR D<>A+5 THEN GOTO
 140
 115>PAUSE 20
 120 LET S=S+1
 130 PRINT "HIT SCORE=";S
 140 LET C=C+1
 145 LET E=E-2
 150 LET A=A+1
 160 IF E=0 THEN  PRINT "YOU HAV
E RUN OUT OF","TIME.SCORE=";S
 170 IF E=0 THEN  STOP
 180 LET B=B-(INKEY$="7")+(INKEY
$="6")
 190 GOTO 60
```

Homeward bound
G Rigby

A very simple but irritatingly difficult game in which the object is to guide the multiplication sign (*) left and right as it travels up the screen so that it arrives home on the addition sign (+).

The "*" moves up the screen automatically and you use keys Z and M to guide it left and right. The "+" is positioned randomly at the top of the screen and the "*" is positioned at the bottom and starts moving immediately.

If you manage to reach the "+" then a message is displayed and your score increased, to continue press any key. If you fail then your score is displayed and you will have to re-run the program for another game.



HOME SWEET HOME

```
1 LET C=0
2 LET D=20
3 CLS
4 LET A=INT (RND*20)
5 LET B=INT (RND*20)
6 PRINT AT 1,B;"+"
7 PRINT AT D,A;"*"
8 LET D=D-1
9 LET A=A+(INKEY$="M")-(INKEY
$="Z")
10 IF D=1 AND A=B THEN GOTO 13
11 IF D<1 THEN GOTO 17
12 GOTO 7
13 LET C=C+1
14 PRINT "MISSION ACHIEVED"
15 PAUSE 1E4
16 GOTO 2
17 PRINT "SCORE:";C
18 STOP
```

Fox and hounds
David Glover

A two player game in which one player is the fox (O) and the other the hounds(*). The hounds start and moves are made by entering the position of the piece to be moved and the position to which you wish to move. This is entered as a four character input: eg 1A2B will move the piece on square 1A to square 2B. Each player gets one move only per turn, and moves should be on the white squares.



The aim of the game is to be the first player to reach the opposite side of the board. Jumping is not allowed and the fox may move back or forward whilst the hounds can only move forward. All the four hounds must be at the edge of the board for them to win.

Tactical hint: If you are the hounds, try and keep in an unbroken line so forcing the fox to retreat until all your hounds can reach the side of the board. If you are the fox, try and force the hounds to leave a space where you can slip through.



```
1 SAVE "F"
2 LET A=1
3 LET B=8
4 LET D=2
5 LET E=36
6 LET I=3
7 LET J=4
10 PRINT " ABCDEFGH"
50 FOR Z=A TO B STEP D
60 PRINT AT Z,A;Z;" ■ ■ ■ ■"
70 NEXT Z
80 FOR Z=A TO B STEP D
90 PRINT AT Z+A,A;Z+A;"■ ■ ■ ■ "
100 NEXT Z
105 PRINT AT A,D;"*";AT A,J;"*"
;AT A,D+J;"*";AT A,B;"*";AT B,A+
J;"O"
110 GOSUB 170
120 PRINT AT F,G;" ";AT H,K;"*"
130 GOSUB 170
140 PRINT AT F,G;" ";AT H,K;"O"
150 GOTO 110
170 INPUT A$
180 LET F=VAL A$(A)
190 LET G=CODE A$(D)-E
200 LET H=VAL A$(I)
210 LET K=CODE A$(J)-E
230 RETURN
```

Union Jack
D Ibrahim

This nifty little program displays a simple graphic representation of the Union Jack; a patriotic program which uses the PLOT function efficiently.

I know that we have a lot of readers throughout the world and it would be nice if we were sent a selection of flag programs (for either machine) — you could then make your own "flags of the world" collection.



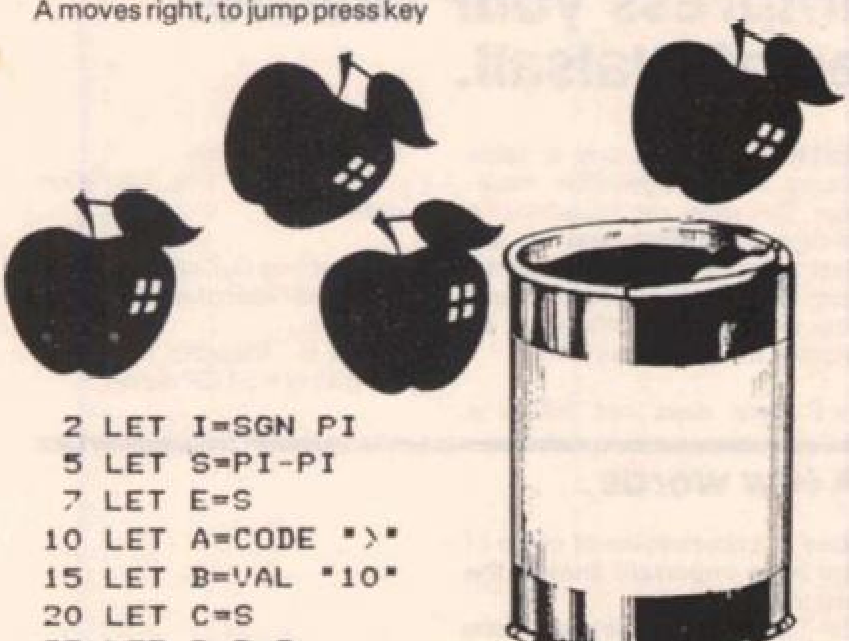
```
1 REM UNION JACK
3 FOR I=3 TO 40
5 PLOT I,40
7 PLOT I,43-I
10 PLOT I,3
11 PLOT I,22
25 PLOT 3,I
30 PLOT 40,I
32 PLOT 22,I
33 PLOT I,I
35 NEXT I
36 PRINT AT 2,26;"GOD",AT 7,26
;"SAVE",AT 12,26;"THE",AT 17,26;
"QUEEN"
40 PAUSE 150
45 CLS
50 GO TO 3
```

Apple catcher
A Murray

Apples are abundant this year! You don't have to pick them, just catch them as they fall from the trees. However, life is never that simple and every now and then a carelessly rolled barrel passes your way over which you will have to jump.

Key 1 moves you left and key A moves right, to jump press key P. The best way to jump is to hold P down until the barrel passes; should you find yourself suspended in mid air press P once more to descend. You cannot catch apples while jumping.

You score one point for each apple caught and the game ends when you miss three apples or you are hit by a barrel. Who said "an apple a day . . . .".



```
  2 LET I=SGN PI
  5 LET S=PI-PI
  7 LET E=S
 10 LET A=CODE ">"
 15 LET B=VAL "10"
 20 LET C=S
 25 LET D=B+B
 30 LET X=INT (RND*B)+3
 40 PRINT AT A,B;CHR$ 130;CHR$
9;AT A+1,B;CHR$ 128;AT A+2,B;CHR
$ 130
 50 PRINT AT C,X;"O"
 60 PRINT AT 20,D;CHR$ 136
 70 LET D=D-I
 80 LET C=C+I
 90 LET B=B+(INKEY$="A")-(INKEY
$="1")
100 IF C=CODE "+" THEN  LET E=E
+I
110 IF C=CODE "+" THEN  GO TO 1
0
120 IF E=3 THEN  GO TO 300
130 IF A=18 AND B=D+I THEN  GO
TO 300
140 IF INKEY$="P" THEN  LET A=A
-1
150 IF A=16 THEN  LET A=18
160 IF C=19 AND A+I=19 AND X=B+
I THEN  LET S=S+I
170 IF C=19 AND A+I=19 AND X=B+
I THEN  GO TO 10
180 CLS
190 GO TO 40
300 PRINT AT 10,20;"SCORE=";S
```

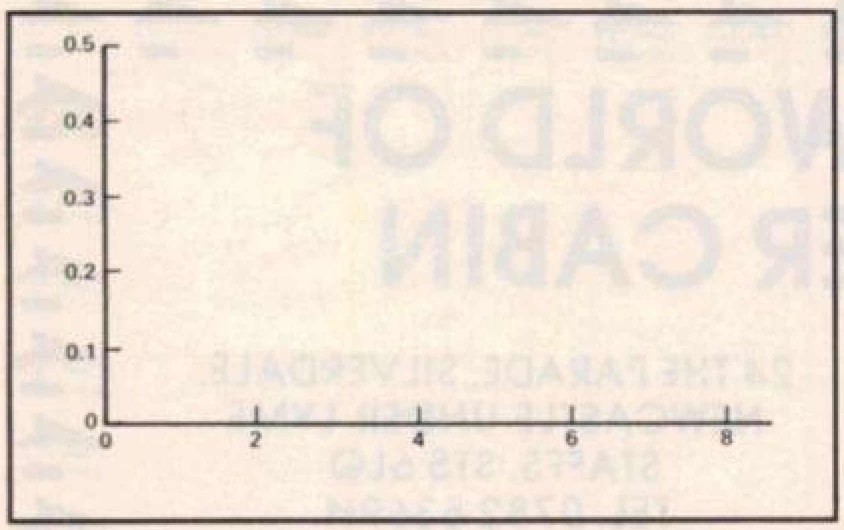
Graph it!

A valuable program to impress your teacher from Paul Bates of Walsall.

This program will plot graphs from given information in one of several styles and can be reused without reentering the data in each of the plotting modes. It is Menu driven and simplicity itself to use. Graph it! can be used to display results from any type of data gathering exercise.

The program itself occupies about 5K and is entirely in BASIC. The Menu has six options:

1) Enter data
2) Choose dot character
3) Choose plot type
4) Draw graph
5) Regression analysis
6) Quit program



OPTION 1 On selecting this option you will first be asked to enter the number of data pairs. The data pairs are then entered with the screen displaying the data pair to be entered next. After data entry you will be asked to give:

1) A graph title
2) An X axis title
3) A Y axis title

(Maximum 10 characters)

You will then be asked for data to define the axes (this could have been done automatically using a bubble sort of data, but I prefer to define my own values to give a neat result). Enter X min, X max Y min, Y max as prompted. The screen will then be cleared and you will be asked to define the X and Y tic mark intervals.

For example:
X data ranges from 1 to 7.6
Y data ranges from 0 to 0.5

Xmin = 0 Xmax = 8
X tic mark = 2
Y min = 0 Y max = 0.5
Y tic mark = 0.1

Beware of setting too small a value for tic mark interval, eg 0.5 for X axis – this would leave the X axis looking rather crowded. After data entry you will be offered a print out of the data pairs entered.

OPTION 2 Gives the choice of .* or + to portray the data points on the graph (see print out).

OPTION 3 Gives you the choice of a point only plot or having the points joined by straight lines (see print out).

OPTION 4 Draws the graph and can be used as many times as necessary after entering data (eg to change options 2 or 3).

(NOTE If options 2 and 3 are not set the default values give a point only print out, using a full stop to denote data position.)

You will now be asked if you want a copy after which you will return to the Menu.

OPTION 5 Produces a table giving linear regression equation. This gives the equation of a straight line which best fits the data points entered. (This works over all the data points entered.) The regression coefficient r indicates the goodness of fit.

r = 0 data does not follow a linear relationship
r = 1 perfectly fits equation determined

r values above 0.7 can be said to be a good indication of linear behaviour.

OPTION 6 Escapes from program giving a STOP report.

A few words . . .

Here is a breakdown of some of the more important lines in the program:

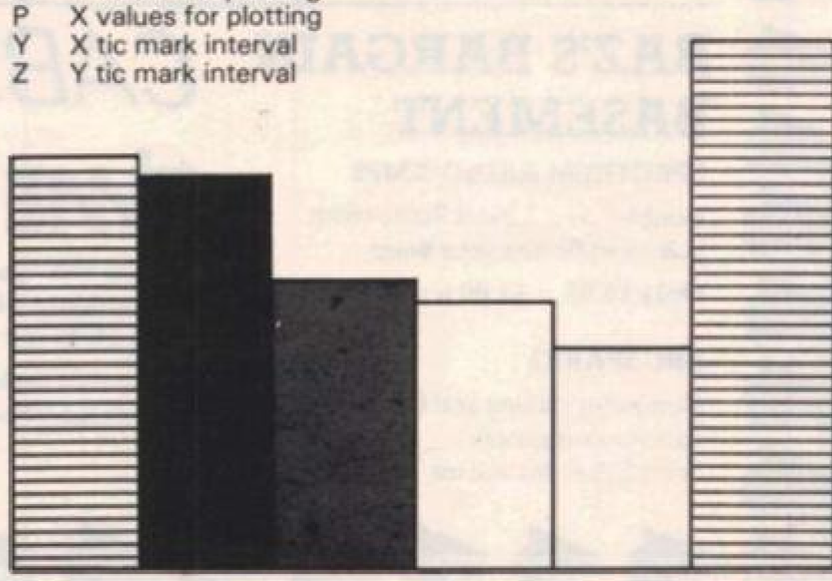
20-140	Sets up Menu
1000-1600	Enter data option
2000-2140	Character option
3000-3080	Plot option
4000-4040	Draws axes
4040-4320	Plots tic marks and numbers axes
4330-4420	Plots Y axis title vertically
4420-4520	Plots points
4700-4760	Routine to join points by straight lines
4800-4830	Asks if copy wanted
5000-5300	Linear regression

Variables

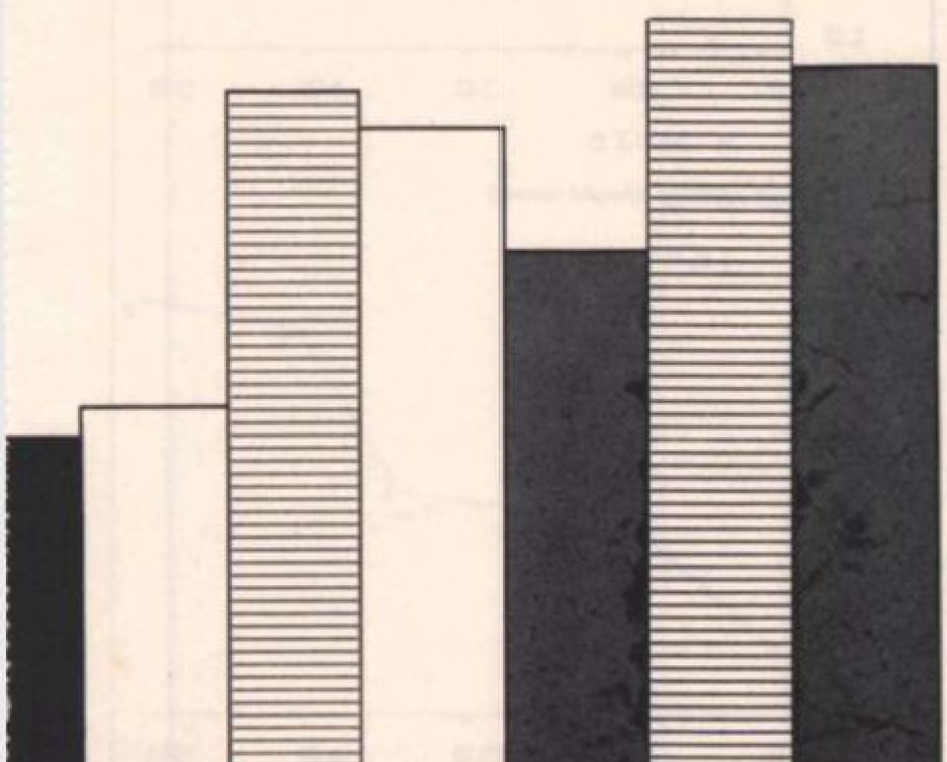
The main variables used are:

A	Menu option
B	Number of data points
C	X min
D	X max
E	Y min
F	Y max
G	Dot character value
H	Plot choice
O	Y values for plotting
P	X values for plotting
Y	X tic mark interval
Z	Y tic mark interval

A$	Graph title
B$	X axis title
C$	Y axis label
D$	Copy of data ?
E$	Copy of graph ?
X(I)	X value (Data pair)
Y(I)	Y value (Data pair)

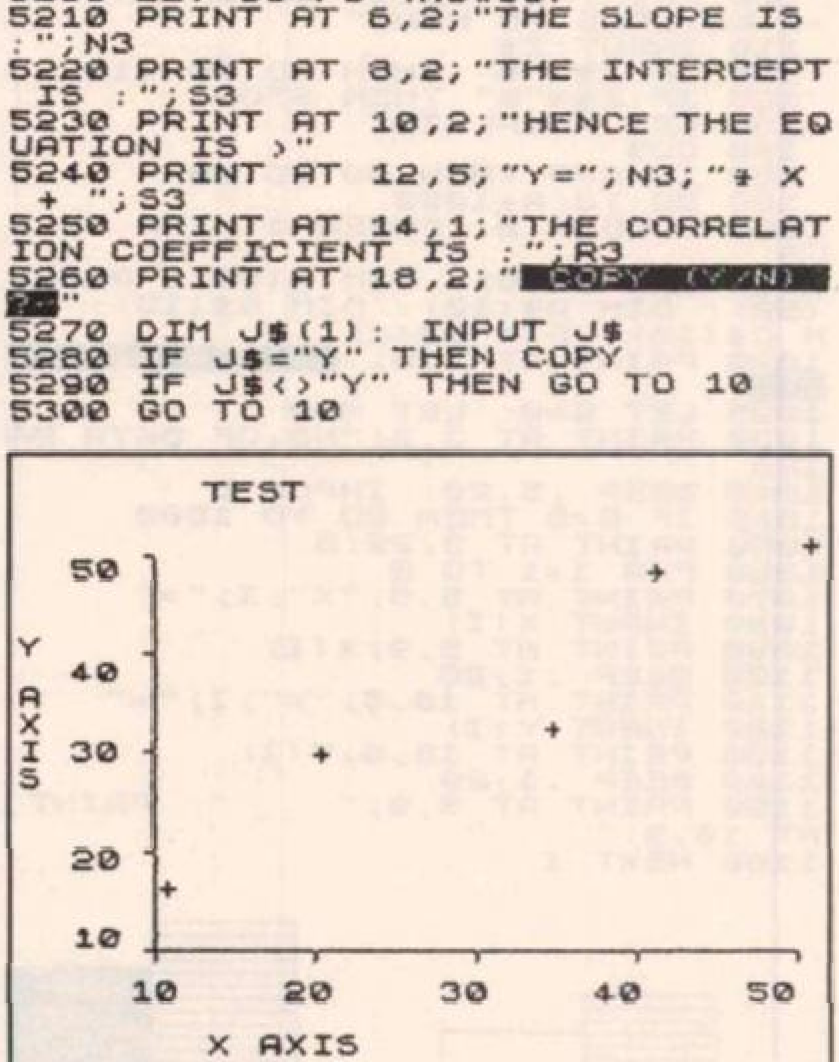


```
  10 BORDER 3: PAPER 6: INK 1: C
LS
  11 POKE 23658,8
  20 PRINT AT 1,3;"  GRAPH IT- B
Y PAUL BATES   "
  30 PRINT AT 3,11;" MENU "
  40 PRINT AT 5,2;"1-ENTER DATA"
  50 PRINT AT 7,2;"2-CHOOSE DOT
CHARACTER"
  60 PRINT AT 9,2;"3-CHOOSE PLOT
 TYPE"
  70 PRINT AT 11,2;"4-DRAW GRAPH
"
  80 PRINT AT 13,2;"5-REGRESSION
 ANALYSIS"
  90 PRINT AT 15,2;"6-QUIT PROGR
AM"
 100 PRINT AT 18,1;"ENTER OPTION
-0 RETURNS TO MENU"
 110 INPUT Z$
 120 IF Z$>"6" THEN GO TO 110
 125 IF Z$="6" THEN STOP
 130 LET A=VAL Z$
 140 CLS
 150 IF A=0 THEN GO TO 10
 160 GO TO A*1000
1000 BORDER 2: PAPER 1: INK 7: C
LS
1010 DIM B(50): DIM X(50): DIM Y
(50): DIM A$(10): DIM B$(10): DI
M C$(10): DIM D$(1)
1020 PRINT AT 1,5;"  1-DATA ENTR
Y  "
1025 LET G=0: LET H=0
1030 PRINT AT 3,2;"NO.OF DATA PA
IRS :"
1040 BEEP .5,20: INPUT B
1045 IF B=0 THEN GO TO 1500
1050 PRINT AT 3,22;B
1060 FOR I=1 TO B
1070 PRINT AT 5,5;"X";I;"="
1080 INPUT X(I)
1090 PRINT AT 5,9;X(I)
1100 BEEP .1,20
1110 PRINT AT 10,5;"Y";I;"="
1120 INPUT Y(I)
1130 PRINT AT 10,9;Y(I)
1140 BEEP .1,20
1150 PRINT AT 5,9;"      ": PRINT
AT 10,9;"      "
1160 NEXT I
```

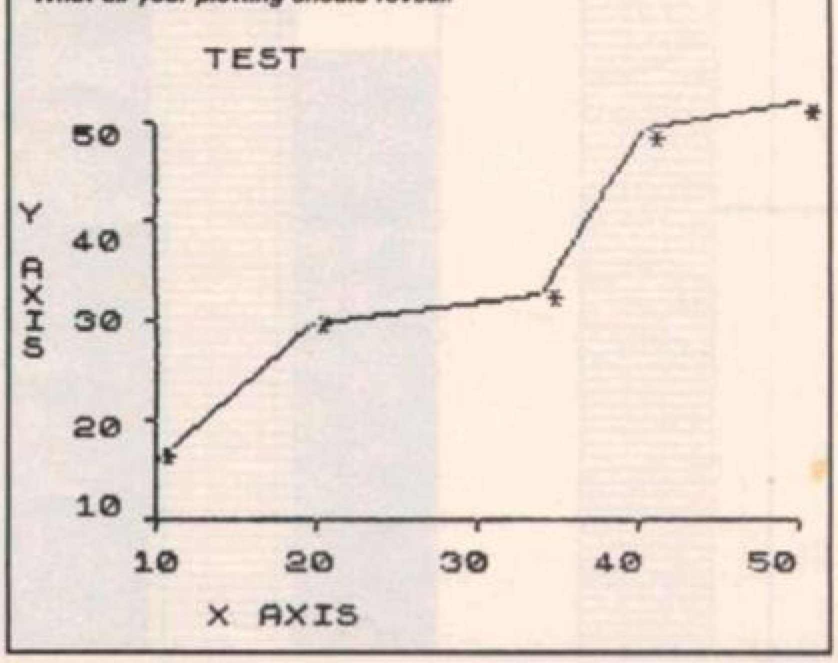


```
1170 PRINT AT 12,1;"GRAPH TITLE
:"
1180 INPUT A$
1190 PRINT AT 12,14;A$
1200 PRINT AT 14,1;"X-AXIS LABEL
:"
1210 INPUT B$
1220 PRINT AT 14,15;B$
1230 PRINT AT 16,1;"Y-AXIS LABEL
:"
1240 INPUT C$
1250 PRINT AT 16,15;C$
1260 PRINT AT 18,1;"X-MIN="
1270 INPUT C
1280 PRINT AT 18,7;C
1290 PRINT AT 18,12;"X-MAX="
1300 INPUT D
1310 PRINT AT 18,18;D
1320 PRINT AT 20,1;"Y-MIN="
1330 INPUT E
1340 PRINT AT 20,7;E
1350 PRINT AT 20,12;"Y-MAX="
1360 INPUT F
1370 PRINT AT 20,18;F
1380 PAUSE 100
1390 CLS
1400 PRINT AT 5,2;"X-TIC MARK IN
TERVAL :"
1410 INPUT Y
1420 PRINT AT 5,25;Y
1430 PRINT AT 10,2;"Y-TIC MARK I
NTERVAL :"
1440 INPUT Z
1450 PRINT AT 10,25;Z
1460 PAUSE 100
1500 CLS : PRINT AT 5,1;"DO YOU
WISH TO HAVE A COPY OF"
1510 PRINT AT 7,1;"THE DATA PAIR
S ENTERED ? "
1520 PRINT AT 11,2; INVERSE 1; F
LASH 1;"ENTER Y OR N"
1530 INPUT D$
1540 IF D$<>"Y" THEN GO TO 10
1542 LPRINT TAB 6;"TITLE :";A$
1544 LPRINT
1550 LPRINT TAB 10;"X";"
  ";"Y"
1560 LPRINT TAB 9;"---";"
  ";"---"
1570 FOR I=1 TO B
1580 LPRINT TAB 9;X(I);"
  ";Y(I)
1590 NEXT I
1600 GO TO 10
2000 BORDER 4: PAPER 6: INK 2: C
LS
2010 REM CHARACTER LETTER IS G
2020 PRINT AT 1,5;" CHARACTER SH
APE ": LET G=0
2030 PRINT AT 4,2;"OPTION 1:  ."
2040 PRINT AT 8,2;"OPTION 2:  *"
2050 PRINT AT 12,2;"OPTION 3:  +"
2060 PRINT AT 14,1; INVERSE 1; F
LASH 1;" ENTER YOUR CHOICE (1,2,
OR 3)"
2070 INPUT G
2080 IF G=1 THEN LET G=46
2090 IF G=2 THEN LET G=42
2100 IF G=3 THEN LET G=43
2110 PRINT AT 18,2;"YOUR CHOICE
IS"
2120 PRINT AT 18,16;CHR$ G
2130 PAUSE 150
2140 GO TO 10
3000 BORDER 5: PAPER 7: INK 2: C
LS
3010 PRINT AT 1,5;"  PLOT CHOICE
": LET H=0
3020 PRINT AT 5,2;"OPTION 1: POI
NTS ONLY"
3030 PRINT AT 10,2;"OPTION 2: PO
INTS JOINED BY"
3040 PRINT AT 11,12;"STRAIGHT LI
NES"
```

```
3050 PRINT AT 15,4; INVERSE 1; F
LASH 1;" ENTER YOUR CHOICE "
3060 INPUT H
3070 IF H<1 OR H>2 THEN GO TO 30
50
3080 GO TO 10
4000 IF G=0 THEN LET G=46
4002 IF H=0 THEN LET H=1
4005 BORDER 5: PAPER 7: INK 0: C
LS
4010 LET I=48: LET J=32
4020 PLOT I,J: DRAW 0,120
4030 PLOT I,J: DRAW 200,0
4040 LET K=17
4050 PLOT I,J: DRAW -3,0
4060 LET L=(F-E)/Z
4070 FOR A=1 TO L
4080 LET J=J+INT (120/L)
4090 PLOT I,J: DRAW -3,0
4100 NEXT A
4110 IF F>0 THEN LET L=(F-E)/Z:
IF F<0 THEN LET L=(((E-F)/Z)*-1)
4115 LET Q=E
4120 FOR I=1 TO L+1
4130 PRINT AT K,2;Q
4140 LET Q=(Q+Z)
4150 LET K=(K-(17/(L+1)))
4160 NEXT I
4170 LET I=48: LET J=32
4180 LET L2=(D-C)/Y
4190 PLOT I,J: DRAW 0,-3
4200 FOR A=1 TO L2
4210 LET I=I+INT (200/L2)
4220 PLOT I,J: DRAW 0,-3
4230 NEXT A
4240 IF D>0 THEN LET L2=(D-C)/Y:
 IF D<0 THEN LET L2=((D-C)/Y)*-1
4250 LET K2=5: LET W=C
4260 FOR A=1 TO L2+1
4270 PRINT AT 19,K2;W
4280 LET W=(W+Y)
4290 LET K2=INT K2+(30/(L2+1))
4300 NEXT A
4310 PRINT AT 21,8;B$
4320 PRINT AT 0,8;A$
4330 REM Y AXIS TITLE
4340 LET M=6
4350 FOR I=1 TO 10
4360 PRINT AT M,0;C$(I)
4370 LET M=M+1
4380 NEXT I
4390 LET N=0: LET N=N+C
4400 LET N2=0: LET N2=N2+E
4420 REM  PLOT POINTS
4430 LET P0=32: LET O0=48
4440 FOR A=1 TO B
4450 LET O=((X(A)-N)/(D-N))
4460 LET O=INT ((O*25)+6)
4470 LET P=((Y(A)-N2)/(F-N2))*15
4480 LET P=INT ((P-17)*-1)
4490 PRINT AT P,O;CHR$ G
4500 IF H=2 THEN GO TO 4700
4510 NEXT A
4520 GO TO 4800
4700 LET Z5=1
4710 LET P1=INT (((P/21)-1)*-175
): LET O1=(O*8)
4720 PLOT O0,P0
4730 DRAW (O1-O0),(P1-P0)
4740 LET P0=P1: LET O0=O1
4750 LET Z5=Z5+1: IF Z5=B THEN G
O TO 4800
4760 GO TO 4510
4800 DIM E$(1): INPUT "COPY(Y/N)
?";E$
4810 IF E$="N" THEN GO TO 10
4820 IF E$="Y" THEN COPY
4830 GO TO 10
5000 BORDER 6: PAPER 4: INK 0: C
LS
5010 PRINT AT 1,6;"LINEAR REGRES
SION"
5020 PRINT AT 4,2;"TEST NAME IS
:";A$
5030 LET D3=0: LET E3=0: LET F3=
0: LET G3=0: LET H3=0
5040 FOR I=1 TO B
5070 LET D3=D3+X(I)
5080 LET E3=E3+Y(I)
5090 LET F3=F3+(X(I)*X(I))
5100 LET G3=G3+(Y(I)*Y(I))
5110 LET H3=H3+(X(I)*Y(I))
5120 NEXT I
5130 LET L3=H3-((D3*E3)/B)
5140 LET M3=F3-((D3*D3)/B)
5150 LET N3=L3/M3
5160 LET O3=D3/B
5170 LET P3=E3/B
5180 LET Q3=SQR (M3*(G3-((E3*E3)
/B)))
5190 LET R3=L3/Q3
5200 LET S3=P3-(N3*O3)
5210 PRINT AT 6,2;"THE SLOPE IS
:";N3
5220 PRINT AT 8,2;"THE INTERCEPT
 IS :";S3
5230 PRINT AT 10,2;"HENCE THE EQ
UATION IS >"
5240 PRINT AT 12,5;"Y=";N3;"* X
 + ";S3
5250 PRINT AT 14,1;"THE CORRELAT
ION COEFFICIENT IS :";R3
5260 PRINT AT 18,2;" COPY (Y/N)
?"
5270 DIM J$(1): INPUT J$
5280 IF J$="Y" THEN COPY
5290 IF J$<>"Y" THEN GO TO 10
5300 GO TO 10
```



What all your plotting should reveal!



The Petron Trichord — a sound choice?

Colin Christmas has a close encounter of the noisy kind with this ZX81/Spectrum unit.



Petron Electronics have produced a music and sound peripheral for use with the ZX81 and the Spectrum. The Trichord can be bought with or without a built in amplifier and speaker and plugs straight into the edge connector or port at the rear of the computer. The basic unit will drive most audio amplifiers, but for playing music it's best if linked up with a stereo hi-fi amplifier. A short lead and connector plug are supplied for this purpose and a programming manual and software cassette also come as part of the package. Four programs are provided on the cassette : "S" for the Trichord's own programmed sound effects, "D" and "G" for producing and utilising User Sound Effects and on the other side of the tape, the Music Program, "M". A demonstration cassette with sound effects and music produced by the Trichord is also available.

If you use the unit with the ZX81, then a 16K RAM pack is necessary to play the music. In its own, you will only be able to use the pre-programmed sound effects in the Trichord's memory. One initial criticism is that as the RAM pack plugs into another edge connector at the rear of the Trichord, the old nightmare of crashing programs caused by the 'Wobblies' is back with a vengeance. Users who don't spend time, money or ingenuity getting the three units firmly linked up and 'bolted down' will find themselves close to tears on more than one occassion in the early stages of getting to know the Trichord. As only the most enthusiastic and more seriously minded micro-user is likely to be interested in the Trichord, it can mean unnecessary frustration and time wasting.

The little black box

The pre-programmed PROM inside the Trichord contains the data for many sound effects. Program "S" enables you to use one POKE instruction and one USR instruction (both clearly laid out in the manual) to select a huge variety of 'blips', 'bongs', 'pings', 'bangs', 'crashes', 'chugs', 'whistles', 'chatters', 'chitters','hisses', 'hoots', 'explosions' and so on! In fact, the POKE instruction selects the sound to be generated and the USR instruction triggers the sound. The manual gives a general guide to the range and variation possible over the 250 or so numbered sounds. It's both intriguing and entertaining just to sit down with this program and find out for oneself what is already contained in the 'little black box'. Thus far, no programming skills at all are needed — so far, so good. But there's more, a LOT more.

The next step may be to add any of the sounds you have now heard to one of your own programs — no problems here either. Load "S" and without altering line 1 of the program, start to type in your program. Two lines (quite familiar by this time) together with the number of the effect you want (see manual) are inserted with line numbers every time a sound effect is required. Suddenly you enter a new dimension, sound!! The end of a simple game has a comic air of finality when accompanied with a rattle of machine gun fire. All that's needed to get the most out of this program is a little imagination — the time taken to expand programs to the new dimension is well spent.

Clever stuff

But even that's hardly getting one's money's worth and of course, the Trichord is designed to go a lot further. Programs "D" and "G" on the software cassette enables the imaginative, creative and simply curious user to devise and then use their own sound effects. "D" is used, with the manual, to explain how the Trichord's sounds are generated. It's fairly technical stuff and surely really intended for more advanced micro-users who are used to converting from binary code to decimal while brushing their teeth in the mornings!

However, unless you are one such a person and therefore already know how internal envelope generators work in units like the Trichord, then it is important to work through this section and this program — if only because you need to know how the 14 registers in the PSG affect the production of sounds if you're going to devise your own effects. That surely is one of the reasons for buying the Trichord in the first place.

Having produced sounds guaranteed to arouse the ▶

curiosity of the most woozy Arcade addict and the occupants of any passing UFOs, you will be ready to decide which of your 'created effects' you want to use and perhaps keep for posterity. Again, it's straightforward enough. The List function is used to display the data for each register. Write it down and when it's time to type in your own program, load "G" from the Software cassette. The computer asks for the necessary data and one by one, for each newly created sound, this data is entered. Follow the manual carefully and it's not too difficult. Finally, of course, the program, with those original and amazing sound effects (yours, naturally) can be saved on tape.

Music micro please!

The Music Program, "M" really is something else!! With the Spectrum, 16K will give a maximum of 674 chords, while 48K will give 6,134 chords. The 16K ZX81 program gives a maximum of 833 chords and there is space for 833 lines of music.

The manual states that the user doesn't have to be able to read music to use the program. This is only true in the strictest, most literal sense. To get the most out of the Trichord Music Program or even get close to getting the most, you need a fair level of music theory and practice behind you. The first question the computer asks after loading is 'SHARPS?' followed by 'FLATS?'. These are necessary to establish which key signature the user wishes to use for a piece of music. As the program progresses it is also necessary to know something about octaves, also about minims, crotchets, quavers, semi-quavers, demi-semi-quavers and hemi-demi-semi-quavers (though not necessarily by these names) because, when copying music into the computer, longer notes have to be converted to the equivalent multiple of the shortest note in order to find out how many computer lines there are in each bar.

The speed at which the music is played can be varied from approximately 10 chords per second with no effective maximum chord length. On the Spectrum, music can actually be played manually by setting the speed to 0.Chords of up to three notes can be played and when typing music in, these are entered one note to each of three channels. Each channel has a separate volume control which you set before the music is played — the computer asks for a number between 0 (silence) and 15 (the loudest). Variation in the stress or volume of individual notes can thus be achieved by changing the notes around between the three channels, if each channel is given a different volume.

Play it again, Sam

At various places in the program there are functions for editing, playback and for listing of music already entered. The Trichord will play back music from any line you choose and list from any line chosen. As with the sounds programs, provided you follow, check, recheck and familiarise yourself with the manual, it's not too difficult. (Assuming that is, that your knowledge of music is adequate.)

Once again, knowledge of the layout of written music is necessary to be able to use the table of notes supplied in the manual not to mention some familiarity with the piano keyboard itself. Anyone who can play the piano but who only has a limited knowledge and experience of computers, will not find this music program easy to use. On the other hand, an experienced computer user with little or no formal knowledge of music will also find the program difficult to use. But, put the two ingredients together, Mr Computer and Mr Music, and the results are very impressive indeed. Go one step further and use professional studio recording equipment and the results, though sounding somewhat 'electronic' are nevertheless remarkable.

The music of course can be saved or printed out if linked to a printer or transferred to a music cassette. Overall, it's an impressive piece of equipment and one can envisage its use, for example in schools where children already have access to computers, showing great potential. However, it's a bit beyond more than a few of us who reckon we're 'quite musical' — perhaps for us it's back to the synthesisers . . .

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The soft touch

James Walsh gives us the low down on some of the latest software releases for the Spectrum.

3D Monster Chase — Romik Software

The idea of 3D Monster Chase is not to chase a monster, as the name rather implies, but to collect seven keys which are hidden in a three level maze. Unfortunately, there are complications: key one has to be found first, you then return to base. Once you have made it back, a bomb is triggered. If you do not find the bomb before it explodes, a life is lost. If the bomb is found in time, it must be taken back to the start. Here the sequence starts all over again but this time both keys one and two must be found, and in that order only.

Just to make it that bit more difficult, as if it needs it, at least one monster is always likely to be following you. Obviously, their sole aim in life is to end your life!

All this goes on in a 3D maze, and although the monsters themselves do get bigger as they approach, they are still flat. There are five levels of play, even on the lowest level I have yet to find the second key. At the top of the screen is a radar, showing your position and those of the monsters and you have a small supply of grenades which are used to destroy monsters at the correct range.

Verdict: The game is fast, though inherently jerky due to the nature of the maze. Finding the keys is no easy matter, let alone disposing of the bomb. Killing monsters is a matter of luck to start with as you are told that the grenades work at the correct range, but what is the correct range?! The chance of finishing the game, even on level one seem pretty small. Personally, I feel the game should have been made a little easier on level one so as to stop the novice giving up in despair. On the whole I fell that 3D Monster Maze is a good game, but not particularly original.

Lasting appeal:	70%
Graphics:	80%
Originality:	50%
Playability:	60%
Use of machine:	80%
Value:	70%

Star Warriors — Visions

For some strange reason you are sitting in space with various coloured aliens moving towards you down the screen. The aim of this part of the game is to kill off all these alien ships without you yourself being hit by one of their swarms of bombs. Once this has been accomplished, your ship is placed at the top of the screen and you slowly start to drift downwards through a meteor storm. Unfortunately, it is impossible to blow up the meteors, rather, it is necessary to avoid them.

Once you have guided your ship to the bottom of the screen, you find yourself on the outside of a small 2D maze. A little man (you presumably) jumps out of your ship, and he/she/it must be guided to the other side to where a crystal lies and then back out again. Progress is hindered by a sort of alien blob, which wishes to shoot you, though he is unharmable. In fact, this particular alien can make life very difficult, simply by sitting next to the entrance to the maze. As soon as you make it back to your ship the game restarts, but with different shaped and more ferocious alien beings.

Verdict: Action is reasonably fast and smooth but yet again the game is rather repetetive. The three different basic concepts do make the game more fun than the straight 'Space Invaders' type scenario from which the first stage is taken. The graphics themselves are quite good but nothing particularly exciting by today's standards. One asset it does possess above some of the flashier games is that it is addictive and fun to play and that counts for quite a lot.

Lasting appeal:	70%
Graphics:	70%
Originality:	70%
Playability:	80%
Use of machine:	70%
Value:	70%

Starclash — Micromega

Apparently, you have been deserted in space by your escort whilst test flying a new starship. Confronted by an Imperial Strike Force, the starship is incapable of out-running the enemy; all that can be done is to stand and fight until your almost inevitable destruction. The Imperial mothership is protected by four types of defence fighter. These must all be destroyed before it is possible to attack the mothership herself. To make it more difficult you are only supplied with three shields and a limited amount of laserbolt energy.

Verdict: Little can be said about Starclash, except that it is only one step up from Space Invaders. Undeniably, the game is addictive but hardly original. Action is too slow to start, and your laserbolts travel painfully slowly. Action is reasonably smooth, the graphics are quite good, and the sound is about as good as can be expected from the Spectrum, fairly poor.

Lasting appeal:	70%
Graphics:	70%
Originality:	40%
Playability:	70%
Use of machine:	60%
Value:	60%

Shark Attack — Romik Software

The idea of this game is to sur





round the octopus or octopi with a net so as to protect them from the sharks, whilst at the same time filling the screen with your net. Each time the required amount of the screen has been filled, the higher level will be selected. As might be expected, every so often one shark, usually one in particular, decides to eat his way through the netting, which does rather undermine the point of the game. Lives are lost from an initial quota of three, either by colliding with a shark or an octopus. This is as far as the game goes, there is nothing left to add, except that is it a success.

Verdict: Simple though it is, the game is fun and exciting and the uncluttered concept is ideal for any age. Unfortunately, its simplicity could be a disadvantage in as much as it may become boring rather rapidly.

Lasting appeal:	50%
Graphics:	60%
Originality:	80%
Playability:	80%
Use of machine:	60%
Value:	70%

Jumbly — DK'Tronics

Jumbly is based on the old fashioned slider puzzle game in which a sequence of numbers, letters or a picture must be rearranged correctly. In this rather advanced, computerised version, a number of specially designed pictures are divided into twenty blocks. The computer jumbles the picture by removing a block and sliding the remaining nineteen about in a random manner. The odd block is then replaced once the puzzle has been completed. You then must rearrange the blocks into the correct order using keyboard or joystick.

A target number of moves for each picture is provided; If this target is exceeded, the picture will have to be attempted again. If on the other hand the target is either met or beaten, then the option of going on to the next puzzle is provided. Titles are given to each puzzle, the next one only being given on the completion of the present one. Fortunately, the first three titles are given beforehand, so giving you a headstart.

Some pictures jumble with wrap-around, ie a block can jump off the end of the puzzle board and reappear on the other side so adding another dimension to the game. Another added extra is the cleverly written tune which plays with each puzzle (and can of course be turned off). If and when you complete all the puzzles, there is an opportunity to win £150 by designing your own picture.

Verdict: The pictures are stunning, the graphics are excellent and the sound is fantastic. An old idea has been put to work very neatly and efficiently, whilst also expanding upon it. The game is surprisingly addictive and often frustrating. The graphics are smooth and a pleasure to watch and the game is a delight from a player's point of view as well as the programmer's.

Lasting appeal:	80%
Graphics:	80%
Originality:	70%
Playability:	80%
Use of machine:	70%
Value:	80%

Computaword Vol 1 — Work Force

Computaword Vol 1 is a digest of ten crosswords to be solved with the aid of a number of rather advanced functions provided by the computer. To start with, a grid is drawn up and each clue can then be attempted. It may display all up or all down clues, or just one clue at the bottom of the screen.

As you battle your way through, the puzzles get harder and harder. The first couple are reasonably easy, whilst the latter ones are more of the Einstein variety. Each attempted solution may be checked without giving away the answer but each puzzle may be simply and easily saved to tape or copied to printer. The signal to give up will cause the display of grid plus all the answers.

Verdict: Computaword has been reasonably well put together, utilizing a number of ways in which a computer can improve upon the basic crossword puzzle. Unfortunately, I feel rather more could have been done to put it out as a real challenger to the orthodox crossword puzzle. The program does its job in producing a computer crossword puzzle but a lot of potential has been left unharnessed. All things considered though, it is still worth thinking about.

Lasting appeal:	70%
Graphics:	30%
Originality:	30%
Playability:	60%
Use of machine:	40%
Value:	50%

Rapedes — Visions

Rapedes, or the Centipedes Revenge, is a copy of the age old arcade game, Centipedes. The scenario is as follows: a centipede is moving across the screen one side to the other getting closer to you all the time. The screen is scattered with mushroom type objects through which the centipede cannot go so it has to come a step closer to you instead. These mushrooms can be shot at and destroyed by your laser if required.

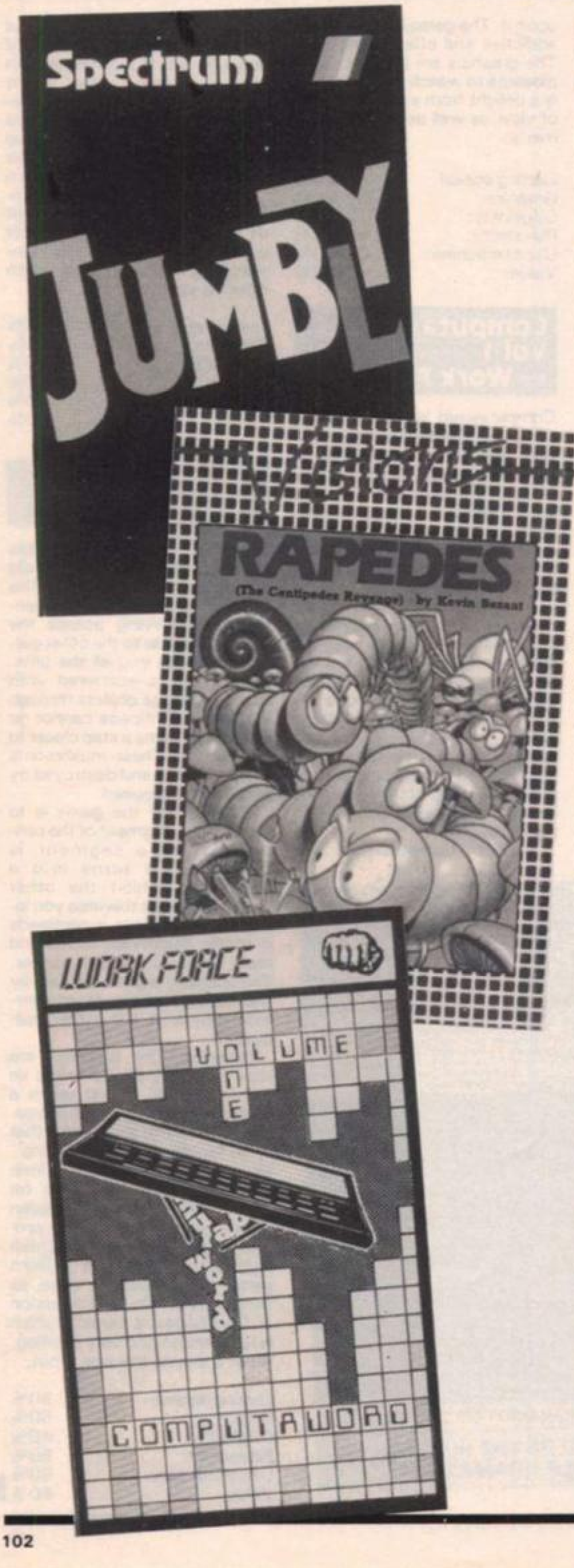
The aim of the game is to shoot every segment of the centipede. As a segment is destroyed, it turns into a mushroom whilst the other segments move towards you independently. Once a centipede is totally destroyed, a new and more viscious one will appear. The scenario is good, as seen by the success of the arcade version, but is it not rather outdated?

Verdict: The graphics are nice but every movement is so painfully slow. If and when a spider appears to wreak havoc, it is so slow and predictable that it is hardly worth worrying about. The explosions are little better and in some cases far worse. An old theme has been copied poorly with obvious programming short-cuts which highlight a less than brilliant game. The potential is there, as can be seen from Artic's version of Centipedes, a version which is fast, furious and very exciting. What a shame this one is not.

Lasting appeal:	50%
Graphics:	50%
Originality:	40%
Playability:	50%
Use of machine:	50%
Value:	50%







Wild West Hero — Timescape

A wild west hero (you, of course) must destroy gang after gang of extremely nasty bandits, whilst avoiding the glowing cacti or any other objects, and most importantly, stay alive!

At the start of the game, the hero is given three lives with which to carry out his task. Armed with an automatic, he must accumulate the highest score possible (surprise, surprise). For the first 20,000 points scored, a bonus life is awarded and for every 10,000 points after that. It is playable with one or two people (or aliens I suppose!) and is compatible with the Kempston joystick interface. There are only four controls — up, down, left, and right. Firing is done by moving in the desired direction.

Verdict: Wild West Hero is definitely fast and furious, at times rather too fast and not a game for the faint hearted! The graphics are fast and reasonably smooth. The only main criticism of the game itself is the lack of further screens or alterations. Apart from that, it is thoroughly enjoyable if not 100% original and very good value indeed. An excellent pub/party-type game.

Lasting appeal:	80%
Graphics:	70%
Originality:	70%
Playability:	80%
Use of machine:	70%
Value:	80%

Dimension Destructors — Artic

Dimension Destructors was written by the author of Tank Battle, a 3D Tanks game, which rather suffered from a severe lack of speed. These 3D techniques have been harnessed in a more adventurous project in Dimension Destructors. Apparently, you are in the lonely but peaceful reaches of the vast unexplored regions of outer space. Suddenly, a dot appears on the scanner screen of your flight craft. As you thrust forward the dot grows until it is a 3D space craft. With nowhere to run and some unexplained reason for believing that the occupant wishes to destroy you, you can either move to avoid it or attempt to hit it with your laser. These alien ships are reasonably tame — they only try to collide with you head-on. As time goes on, more viscious aliens which actually fire at you join in the fight.

Dimension Destructors is compatible with Sinclair, Kempston and Fuller joysticks which is a definite bonus as a joystick greatly enhances the game. Why it is called Dimension Destructors I do not know — where are you destroying time or any other dimension? Nowhere in the instructions/story does it say why the aliens want to exterminate you: aliens do seem to get a very rough deal as far as computer games are concerned! If we are not careful someone will start an ALF, Alien Liberation Front and go around letting all those poor green monsters out of Space Invaders machines!

Verdict: The 3D graphics are some of the best I've seen (bar those of Rommels Revenge and QS's new Tank Battle game). They are fast and reasonably smooth and the whole game is definitely hectic. Though easy to play at the outset, it gets harder and harder as your ability increases. The concept of the game is simple and slightly similar to one or two of the Atari games but overall it is excellent. Dimension Destructors is highly addictive — a game which must be played "just one more time" and very good value.

Lasting appeal:	80%
Graphics:	90%
Originality:	70%
Playability:	90%
Use of machine:	80%
Value:	90%

Further information on any of the games reviewed in this article can be obtained from the following addresses:

Romik Software Ltd, 277 Argyll Avenue, Slough, Berks

Visions Software Factory Ltd, 1 Felgate Mews, Studland Street, London W6 9JT

Micromega, 230-236 Lavender Hill, London SW11 1LE

DK'Tronics, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AX

Work Force, 140 Wilden Avenue, Luton, Beds

Timescape, 1 Virginia Gardens, Fairways, Milngavie, Glasgow G62 6L6

Artic Computing Ltd, Main Street, Brandesburton, Driffield YO25 8RL

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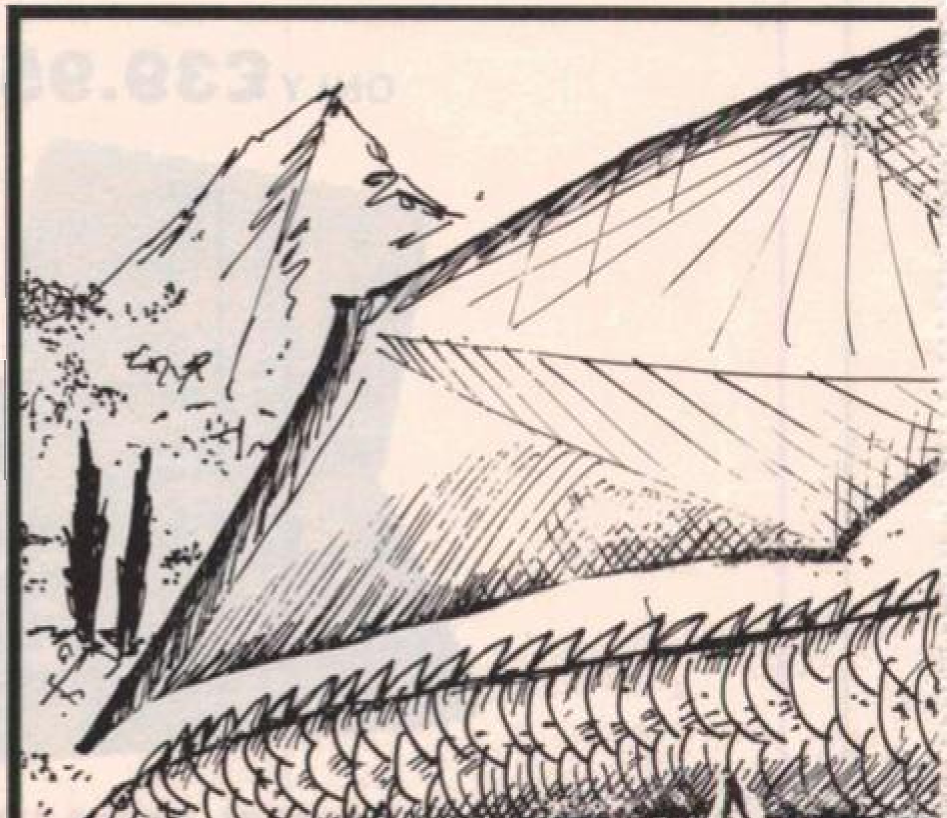
A ZX81 game that is just out of this world from Andrew Turner in Hull.

Although this game is nearly a full 16K and a lot of typing is needed, it will provide many hours of play due to the use of random factors.

You have been transported to Mars by the mysterious Professor and have to find and kill the ubiquitous dragon who inhabits the planet. Unfortunately, he is guarded by a fierce character who cannot be killed — your only chance is to collect six lots of gold (6000) with which to bribe him to let you past.

Once you have destroyed the dragon then you only have to find your way back to the entrance on level one to win. Easy? There are three levels, each consisting of 28 caves, ie a total of 84 locations. On level one you can find a magic ring that will make you invisible which is a great help, because you'll certainly need it!

Such old favourites as Balrogs, Goblins, Serpents and Trolls have to be dealt with, not forgetting the Martians



```
5 REM "HOM"
7 LET ARK=0
8 LET RING=0
9 LET LEV=1
10 LET GOLD=0
11 LET X=1
12 LET Y=1
13 GOSUB 9900
14 SLOW
16 PRINT AT 0,0;"*************
********************        THE MA
RTIAN AFFAIR        *************
*******************"
20 PRINT AT 10,0;"DO YOU WANT
THE STORY (Y OR N?)"
```

themselves. Contents of the caves on each level are rearranged by the inhabitants as you change level, a peculiar Martian trait caused by the ZX81s memory limitations.

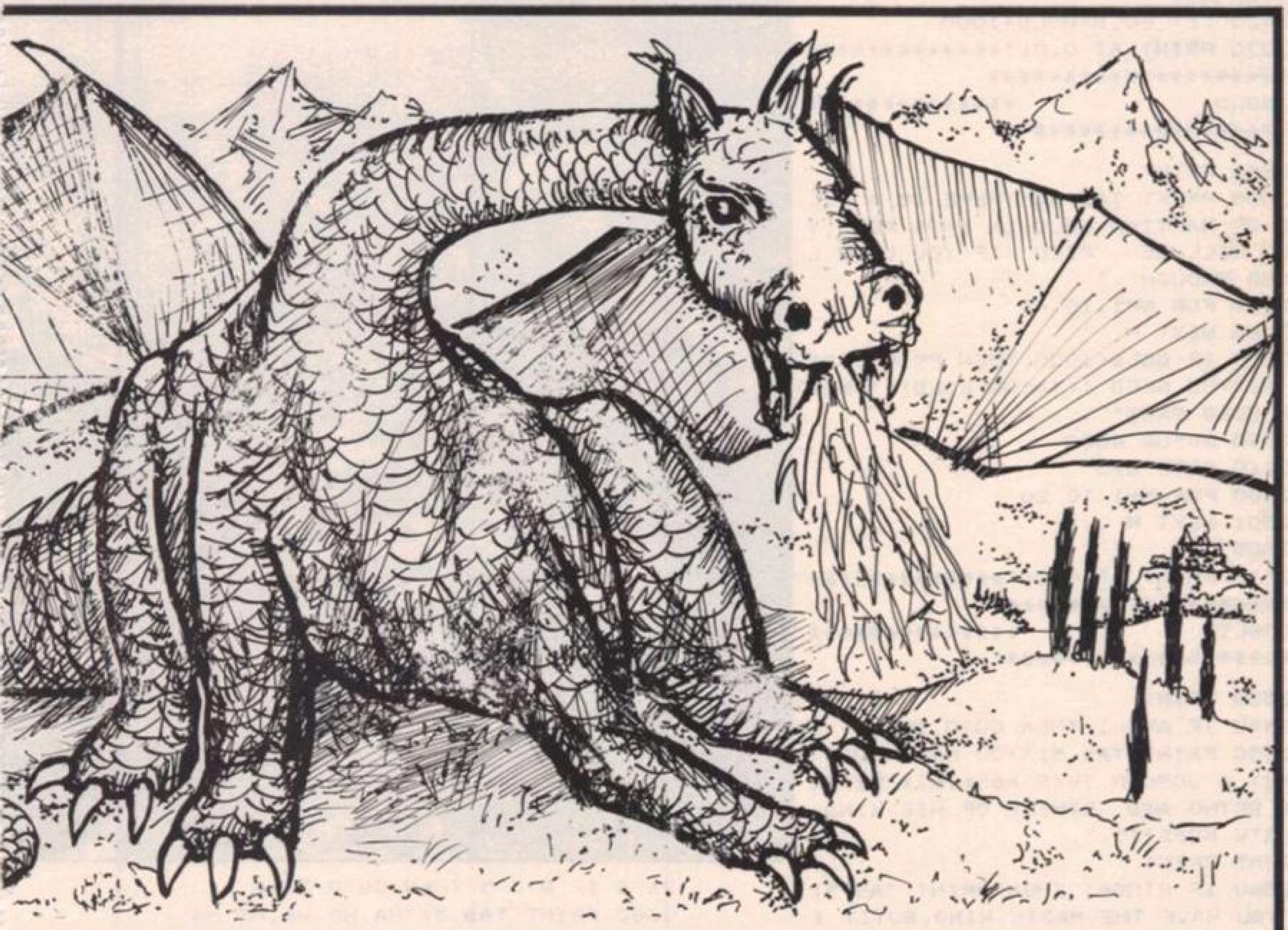
When you start the game you will probably not be able to move immediately as the cave you have been transported to may contain something . . .

A note of warning

To help you play the game, full instructions are included in the listing but this listing was not printed on a Sinclair printer and graphic characters have been replace by a simple code. This consists of a number (no number means only one character) which is the number of characters needed, followed by "g" to indicate graphics mode, and finally a letter or number which is the key of the character. The code "is" means inverse space, ie"█".

These codes are combined with a "+" as a separator, so the code "2is + 2ga" means two inverse spaces and two characters obtained by graphics mode shift/key A. Lower case messages are to be typed in inverse mode.

I hope you will find this easy to enter, I know it is less than simple, but I think that you will agree with me that it makes the rest of the program easier to read. Now play on . . .



```
  30 IF INKEY$="Y" THEN GOSUB 93
00
  40 IF INKEY$="N" THEN GOTO 500
  50 GOTO 30
 500 LET X=1
 510 LET Y=1
 520 LET LEV=1
 550 LET D=(X*4)+2
 560 LET A=(Y*4)-2
 565 GOSUB 9500
 570 PRINT AT D,A;"*"
 580 FOR N=1 TO 50
 590 NEXT N
 610 IF L(X,Y)=1 THEN GOTO 2000
 620 IF L(X,Y)=2 THEN GOSUB 2500
 630 IF L(X,Y)=3 THEN GOSUB 3000
 640 IF L(X,Y)=4 THEN GOSUB 3500
 650 IF L(X,Y)=5 THEN GOSUB 4000
 660 IF L(X,Y)=6 THEN GOSUB 4500
 670 IF L(X,Y)=7 THEN GOSUB 5000
 680 IF L(X,Y)=8 THEN GOTO 5300
 690 IF L(X,Y)=0 THEN GOSUB 5500
 695 GOSUB 9500
 700 IF INKEY$="5" THEN GOTO 600
0
 710 IF INKEY$="6" THEN GOTO 610
0
 720 IF INKEY$="7" THEN GOTO 620
0
 730 IF INKEY$="8" THEN GOTO 630
0
```

```
740 IF INKEY$="U" THEN GOTO 640
0
750 IF INKEY$="D" THEN GOTO 650
0
790 GOTO 700
2000 FOR N=1 TO 20
2010 NEXT N
2011 LET L(X,Y)=0
2020 CLS
2025 LET GOLD=GOLD+1000
2030 PRINT AT 0,0;"*************
*******************
 GOLD             *************
******************"
2046 PRINT
2050 PRINT TAB 5;"THERE IS A PIL
E OF MARTIAN GOLD IN THIS ROOM,Y
OU WILL BE   RICH (IF YOU LIVE L
ONG ENOUGH)."
2060 FOR N=1 TO 40
2065 NEXT N
2070 IF GOLD<6000 THEN PRINT TAB
 4;"YOU NEED ";(6000-GOLD);" MOR
E GOLD BARS"
2090 GOSUB 4050
2110 GOTO 695
2500 FOR N=1 TO 20
2501 NEXT N
2505 CLS
2510 PRINT AT 0,0;"*************
*******************
GOBLIN            *************
******************"
2530 PRINT
2540 IF ARK=1 THEN GOTO 2900
2550 PRINT TAB 5;"YOU HAVE JUST
MET A GOBLIN.THIS horrible LITTL
E BEING AND  OTHERS OF HIS KIND
HATE HOBBITS."
2555 PRINT
2560 IF RING=1 THEN PRINT TAB 5;
"YOU HAVE THE MAGIC RING,BUTIT I
S SO DARK IN THIS PARTICULARCAVE
 THAT BEING INVISIBLE IS NO GOOD
 TO YOU."
2570 PRINT
2580 GOSUB 4050
2590 PRINT TAB 5;"IN THE DARKNES
S OF THE CAVETHE GOBLIN CAN SENS
E YOUR     POSITION,BUT YOU CA
NNOT SEE HIM."
2630 GOSUB 4050
2640 CLS
2650 PRINT TAB 5;"THE GOBLIN IS
NOW CHASING  YOU AROUND THE CAVE
,WILL HE     CATCH YOU?"
2655 GOSUB 4050
2660 LET Q=RND
```



```
2670 IF Q>.75 THEN GOTO 2950
2680 PRINT TAB 5;"HA HA HA,HE HA
S GOT YOU."
2690 IF Q<.25 THEN PRINT TAB 5;"
YOU HAVE BEEN BOILED IN OIL

  aaaaarrrrrrrrrggggggh  "
2700 IF Q>=.25 AND Q<.5 THEN PRI
NT TAB 5;"YOU HAVE BEEN ROASTED
FOR  DINNER
           chomp chomp chomp gul
p "
2710 IF Q>=.5 AND Q<=.75 THEN PR
INT TAB 5;"YOU HAVE BEEN DROPPED
 INTO A LAKE OF MOLTEN LAVA

            aaaaaaiiiiiiiieeeeee
ee "
```



```
2720 GOSUB 4050
2730 GOTO 9200
2900 PRINT
2910 PRINT TAB 5;"YOU HAVE THE A
RKENSTONE,   WHICH IS PROTECTING
 YOU AGAINST THE GOBLIN."
2920 GOSUB 4050
2930 RETURN
2950 PRINT "    NO...,YOU HAVE
ESCAPED HIM."
2960 GOSUB 4050
2970 RETURN
3000 FOR N=1 TO 20
3001 NEXT N
3010 CLS
3020 PRINT AT 0,0;"*************
*******************            S
ERPENTS             *************
*******************"
3030 PRINT
3040 PRINT TAB 5;"YOU HAVE ENTER
ED A CAVE    WHICH HAS MANY HIDD
EN PITS      CONTAINING THOUSAND
S OF SERPENTS"
3050 PRINT
3065 IF ARK=1 THEN GOTO 3400
3070 PRINT TAB 5;"CAN YOU GET TH
ROUGH WITHOUTFALLING INTO A PIT?
"
3080 GOSUB 4050
3090 PRINT
3100 LET Q=RND
3110 IF Q>.5 THEN GOTO 3300
3120 PRINT TAB 5;"YOU HAVE FALLE
N DOWN A PIT AND SINCE THE  SERP
ENTS ARE        VAMPIRES,YOU HAVE B
ECOME           A BLOOD DONOR."
3130 GOSUB 4050
3140 GOTO 9200
3300 PRINT TAB 5;"YOU HAVE MANAG
ED TO GET BY WITHOUT FALLING DOW
N A PIT."
3310 GOSUB 4050
3320 RETURN
3400 LET Q=RND
3410 PRINT TAB 5;"YOU HAVE THE A
RKENSTONE    WHICH PROTECTS YOU
FROM SNAKE    BITES."
3420 IF Q>.75 THEN PRINT TAB 5;"
YOU ARE PROTECTED FROM      SNAKE
 BITES,BUT YOU HAVE FALLEN DOWN
A VERY DEEP PIT AND DIED OFSTARV
ATION,BECAUSE YOU CANNOT    GET O
UT."
3430 GOSUB 4050
3450 IF Q>.75 THEN GOTO 9200
3460 RETURN
3500 FOR N=1 TO 20
3501 NEXT N
3505 CLS
3510 PRINT AT 0,0;"*************
*******************
BALROG              *************
*******************"
3525 PRINT
3530 IF ARK=0 AND RING=0 THEN PR
INT TAB 5;"YOU HAVE JUST MET THE
       BALROG,HE IS A ---disgusti
ng--- CREATURE,WITH VERY BAD MAN
NERS- -HE HAS JUST SPLIT YOU IN
TWO.  -aaaaiiiieeee-"
3540 IF ARK=1 THEN PRINT TAB 5;"
YOU HAVE MET THE BALROG,BUTTHE A
RKENSTONE PROTECTS YOU."
3550 IF RING=1 AND ARK=0 THEN PR
INT TAB 5;"      YOU HAVE MET THE
 BALROG,BUTYOU ARE WEARING THE M
```

```
AGIC RING  SO HE CANNOT SEE YOU.
"
3560 PRINT
3570 IF RING=0 AND ARK=0 THEN PR
INT TAB 5;"THIS IS ONLY A TEMPOR
ARY   INCONVENIENCE,MEANING THAT
 YOU  WILL HAVE TO START AGAIN."
3580 GOSUB 4050
3590 IF ARK=0 AND RING=0 THEN GO
TO 9200
3620 RETURN
4000 FOR N=1 TO 20
4010 NEXT N
4015 CLS
4020 PRINT AT 0,0;"*************
*******************          M
ARTIANS   *************
*****************"
4036 PRINT
4040 PRINT TAB 5;"THERE ARE MART
IANS IN HERE WHICH IS NOT SURPRI
SING SINCE  WE ARE ON MARS"
4045 GOTO 4090
4050 PRINT "PRESS NEWLINE TO CON
TINUE"
4060 INPUT Q$
4065 RETURN
4090 IF RING=1 THEN PRINT TAB 5;
"YOU HAVE THE MAGIC RING   BUT
IT IS USELESS AGAINST THE  MART
IANS."
4100 IF ARK=1 THEN PRINT TAB 5;"
YOU HAVE THE ARKENSTONE BUTITS M
AGIC DOES NOT WORK AGAINST MARTI
ANS."
4110 GOSUB 4050
4115 CLS
4120 PRINT TAB 5;"THE MARTIANS A
RE A CLEVER  RACE,AND ARE GOING
TO GIVE YOU  THREE GUESSES AT TH
EIR SECRET   NUMBER (BETWEEN 1 A
ND 5).              IF YOU GUESS C
ORRECTLY,    THEY WILL LET YOU G
O,IF NOT     THEY WILL BLAST YOU
 WITH THEIR      RAY GUNS."
4125 LET Q=INT (RND*5)+1
4130 GOSUB 4050
4135 CLS
4136 FOR F=1 TO 3
4140 PRINT TAB 5;"***--ENTER GUE
SS--***"
4150 INPUT G
4160 IF G=Q THEN GOTO 4200
4170 NEXT F
4175 PRINT TAB 5;"zzziiiippp YO
U HAVE JUST  BEEN MELTED-bye bye
-"
4180 GOSUB 4050
4190 GOTO 9200
4200 PRINT
4210 PRINT TAB 5;"YOU GUESSED CO
RRECTLY.     THE NUMBER WAS ";Q
4220 GOSUB 4050
4230 RETURN
4500 FOR N=1 TO 20
4501 NEXT N
4505 CLS
4510 PRINT AT 0,0;"*************
******************
TROLL              *************
*****************"
4525 IF ARK=1 OR RING=1 OR (ARK=
1 AND RING=1) THEN GOTO 4600
4530 PRINT
4540 PRINT TAB 5;"YOU HAVE MET A
 TROLL.THIS  IS A GREEDY CREATUR
E,WITH VERY  SHARP TEETH.
                    HE DEMANDS 2 L
OTS OF YOUR  GOLD SO HE CAN BUY
FOOD FROM    THE CANTEEN AFTER T
HIS GAME."
4545 PRINT
4546 GOSUB 4050
4547 CLS
4550 IF GOLD>2000 THEN GOTO 4900
4560 IF GOLD=2000 THEN GOTO 4800
4570 PRINT TAB 5;"YOU HAVENT GOT
 ENOUGH GOLD,-OH DEAR- THAT MEAN
S HE WILL    HAVE TO EAT YOU."
4575 GOSUB 4050
4580 PRINT "
             crunch crunch crunc
h ***gulp***
                  LOOK ON THE BRI
GHT SIDE,YOUWILL PROBABLY GIVE H
IM               INDIGESTION"
4585 GOSUB 4050
4590 GOTO 9200
4600 IF ARK=1 THEN PRINT TAB 5;"
THE ARKENSTONE IS            PROTE
CTING YOU FROM THE TROLL,  BUT Y
OU MAY LEAVE HIM SOME GOLD IF YO
U WISH."
4610 IF ARK=0 AND RING=1 THEN PR
INT TAB 5;"
                YOU ARE WEARING THE M
AGIC  RING, THE TROLL CANNOT SEE
 YOU, BUT YOU MAY LEAVE HIM SOME
 GOLD IF YOU WISH."
4620 GOSUB 4050
4630 RETURN
4800 PRINT TAB 5;"AW WHAT A SHAM
E HE HAS      TAKEN ALL YOUR GOLD
."
4805 LET GOLD=0
4810 GOSUB 4050
4820 RETURN
```

```
4900 PRINT TAB 5;"YOU HAVE ENOUG
H GOLD TO    GIVE HIM TWO LOTS."

4910 LET GOLD=GOLD-2000
4920 GOSUB 4050
4930 RETURN
5000 FOR N=1 TO 20
5001 NEXT N
5005 CLS
5010 PRINT AT 0,0;"*************
*******************
  EXIT         *************
******************"
5025 PRINT
5030 PRINT TAB 5;"YOU HAVE FOUND
 THE EXIT,    THIS IS ACTUALLY TH
E PROFESSORS PERSONALISED MINI M
ATTER         TRANSPORTER."
5040 PRINT
5050 IF ARK=1 THEN GOTO 5200
5070 PRINT TAB 5;"BUT YOU HAVENT
 GOT THE      ARKENSTONE,SO GO AN
D GET IT YOU HORRIBLE LITTLE ADV
ENTURER,OR   THE PROF. WILL FEED
 YOU TO THE  TROLLS."
5080 GOSUB 4050
5090 RETURN
5200 PRINT TAB 5;"YOU HAVE GOT T
HE STONE,    OH YOU ARE A CLEVER
 ADVENTURER  (IVE GOT TO SAY THA
T OR YOU     WOULD SWITCH ME OFF
)"
5210 PRINT
5220 GOSUB 4050
5230 PRINT "FOR YOUR COURAGE,THE
 PROF.  MAY GIVE YOU A REWARD-(S
OMETHING     LIKE A BRAIN PERHAPS
?),THEN      AGAIN,HE MIGHT NOT,A
WELL."
5250 GOSUB 4050
5260 GOTO 8500
5300 FOR N=1 TO 20
5301 NEXT N
5302 LET L(X,Y)=0
5305 CLS
5310 PRINT AT 0,0;"*************
*******************         MA
GIC RING        *************
******************"
5320 PRINT
5330 PRINT TAB 5;"YOU HAVE FOUND
 THE ONE AND ONLY MAGIC RING,WHI
CH MAKES YOU INVISIBLE TO ALL EX
CEPT MARTIANSAND SMAUG."
5350 PRINT
5360 LET RING=1
5370 PRINT TAB 5;"DAMN,THAT MEAN
S YOU WILL   PROBABLY SURVIVE TH
IS GAME,.... OH WELL,I CAN STILL
 TRY TO GET  YOU KILLED."
5380 PRINT
5400 PRINT TAB 10;"I SUPPOSE..."
5410 GOSUB 4050
5420 GOTO 695
5500 FOR N=1 TO 20
5501 NEXT N
5505 CLS
5510 PRINT AT 0,0;"*************
********************************
*******************

                  ****      NOT
HING HERE         ****
                  **************
********************************
******************"
5526 PRINT
5527 GOSUB 4050
5528 CLS
5530 RETURN
6000 IF Y=1 THEN GOTO 700
6010 LET Y=Y-1
6020 GOTO 550
6100 IF X=4 THEN GOTO 550
6110 LET X=X+1
6120 GOTO 550
6200 IF GOLD>=6000 AND X=1 AND L
EV=3 AND Y=7 THEN GOTO 9000
6205 IF LEV=3 AND X=1 AND Y=7 TH
EN GOTO 8000
6210 IF X=1 THEN GOTO 700
6220 LET X=X-1
6240 GOTO 550
6300 IF Y=7 THEN GOTO 700
6310 LET Y=Y+1
6320 GOTO 550
6400 IF LEV=1 THEN GOTO 700
6410 LET LEV=LEV-1
6415 LET A=X
6420 LET B=Y
6430 GOSUB 9900
6450 SLOW
6460 GOTO 550
6500 IF LEV=3 THEN GOTO 700
6510 LET LEV=LEV+1
6520 GOTO 6430
8000 FOR N=1 TO 30
8005 NEXT N
8010 CLS
8020 GOTO 8200
8040 CLS
8050 FOR N=0 TO 4
8051 PRINT "32is"
8052 NEXT N
8053 PRINT "15is+2ga+15is"
8054 PRINT "13is+6ga+13is"
8055 PRINT "12is+8ga+12is"
8056 PRINT "11is+10ga+3is+(smaug
)+3is"
```

```
8057 PRINT "10is+12ga+2is+(lives
)+3is"
8058 PRINT "9is+3ga+2g7+4ga+2g7+
3ga+2is+(here)+3is"
8059 PRINT "9is+3ga+3gg+4ga+2gg+
3ga+9is"
8060 PRINT "8is+13ga+2S+1ga+8is"
8061 PRINT "8is+1ga+2S+9ga+4S+8i
s"
8062 PRINT "8is+1ga+3S+7ga+4S+1g
a+8is"
8063 PRINT "8is+1ga+4S+5ga+5S+1g
a+8is"
8064 PRINT "8is+ga+4S+5ga+5S+ga+
8is"
8065 PRINT "7is+3ga+2S+ga+ge+gr+
ga+ge+gr+ga+3S+3ga+7is"
8066 PRINT "7is+3ga+2S+ga+gw+gq+
ga+gw+gq+ga+3S+3ga+7is"
8067 PRINT "7is+gf+ga+gf+ga+2S+5
ga+3S+ga+gf+ga+gf+7is"
8068 PRINT "64ga"
8090 FOR N=1 TO 100
8095 NEXT N
8096 CLS
8100 PRINT AT 0,0;"*************
********************************
*********************
                 ****         SM
AUGS DEN         ****
                 ***************
********************************
*******************"
8120 RETURN
8200 GOSUB 8040
8210 PRINT
8220 PRINT TAB 5;"YOU HAVE ENTER
ED SMAUGS DENBUT YOU DO NOT HAVE
 ENOUGH GOLD TO BRIBE THE GUARD,
SO HE              KILLS YOU"
8230 PRINT
8240 GOSUB 4050
8250 IF RING=1 THEN PRINT TAB 5;
"THE RINGS MAGIC WONT WORK
 NEAR SMAUG."
8260 IF RING=1 THEN GOSUB 4050
8270 GOTO 9200
8500 FOR N=1 TO 100
8510 NEXT N
8520 CLS
8525 GOTO 8570
8530 PRINT "********************
********************************
************"
8540 FOR N=1 TO 18
8550 PRINT "**28is**"
8560 NEXT N
8565 PRINT "********************
********************************
```

```
************"
8568 RETURN
8570 GOSUB 8530
8575 PRINT AT 5,8;"very well don
e";
8580 FOR N=1 TO 50
8590 NEXT N
8600 PRINT AT 6,8;"you have show
n,";AT 8,8;"that you are as :-";
AT 10,12;"brave'";AT 12,12;"cunn
ing'";AT 14,10;"and clever'";AT
16,4;"lucky as the professor"
8610 FOR N=1 TO 100
8620 NEXT N
8630 PRINT AT 20,2;"any key for
another game...."
8640 IF INKEY$="" THEN GOTO 8640
8650 CLS
8655 RUN
9000 FOR N=1 TO 30
9005 NEXT N
9010 GOSUB 8040
9020 PRINT
9030 LET GOLD=GOLD-6000
9040 PRINT TAB 5;"YOU HAVE ENTER
ED SMAUGS DENAND HAVE BRIBED THE
 GUARD WITH  6000 GOLD BARS."
9060 PRINT
9070 PRINT TAB 5;"BUT SMAUG ALWA
YS SLEEPS      WITH ONE EYE OPEN,A
ND HAS SEEN    YOU."

9080 PRINT
9090 GOSUB 4050
9095 CLS
9100 PRINT TAB 5;"YOU HAVE ONLY
FIVE ARROWS WITH WHICH TO SHOOT
 SMAUG,     PRESS ""1"" TO SHOO
T."
9105 LET ARR=5
9110 IF INKEY$<>"1" THEN GOTO 91
10
9120 IF RND>.80 THEN GOTO 9150
9125 PRINT " zzzzzziiiiiiipppp
 you missed
            "
9130 LET ARR=ARR-1
9131 IF ARR=0 THEN GOTO 9145
9132 GOTO 9110
9145 GOTO 9200
9150 PRINT " zzzzzziiiiiiipppp
you hit him     ggrrrrraaaaaaaaa
aaa........          you have kil
ed smaug        you have won the
arkenstone  "
9151 LET ARK=1
9160 LET X=1
9170 LET Y=7
9190 LET LEV=3
```

```
9191 GOSUB 4050
9195 GOTO 550
9200 FOR N=1 TO 20
9201 NEXT N
9205 CLS
9210 GOSUB 8530
9220 PRINT AT 6,5;"you bungling
idiot...."
9230 FOR N=1 TO 20
9231 NEXT N
9232 PRINT AT 10,5;"the prof wil
l feed you";AT 12,5;"to the trol
ls..."
9240 GOTO 8630
9300 CLS
9310 PRINT "********************
*************           INSTRUCTIO
NS          ********************
************"
9320 PRINT
9330 PRINT "        YOU ARE AN ADV
ENTURER.....(THE PROFESSORS LITT
LE BROTHER),YOU,SMAUG AND SOME O
THER NASTIESHAVE BEEN TRANSPORTE
D TO MARS.";TAB 6;"YOU ARE IN A
NETWORK OF    TUNNELS AND CAVES.T
HERE ARE      THREE LEVELS, EACH
LEVEL HAVING 28 CAVES (7 X 4) MA
KING A TOTAL OF 84 CAVES."
9360 PRINT "       YOU MOVE ABOUT
ON A LEVEL  USING THE CURSORS,UP
 A LEVEL     USING ""U"",DOWN,USI
NG""D"""
9370 PRINT "PRESS ANY KEY TO CON
TINUE"
9380 IF INKEY$="" THEN GOTO 9380
9395 CLS
9400 PRINT "        YOU MUST COLLEC
T 6 LOTS OF GOLD TO BRIBE SMAUGS
 GUARD THEN KILL SMAUG,STEEL THE
 ARKENSTONE,AND FIND THE EXIT.(W
ATCH OUT FOR THE NASTIES)."
9405 PRINT "     SMAUGS CAVE CAN
ONLY BE       SEEN FROM LEVEL 3 (Y
OU MUST       ENTER HIS CAVE TO BR
IBE THE       GUARD"
9406 PRINT "THE EXIT IS ON LEVEL
 1,THERE IS A MAGIC RING ON LEVE
L 1 TO HELP YOU.
              THE ARKEN STONE HELP
S PROTECT     YOU.--BAD LUCK--."
9410 PRINT "PRESS ANY KEY TO STA
RT"
9420 IF INKEY$="" THEN GOTO 9420
9439 GOTO 500
9500 CLS
9501 PRINT AT 3,6;"LEVEL ";LEV;A
T 3,14;"GOLD=";GOLD
9505 LET A$="29is"
9510 LET B$="is+3S+is+3S+is+3S+i
s+3S+is+3S+is+3S+is+3S+is"
9520 LET C$="is+27S+is"
9530 LET D$="2is+S+3is+S+3is+S+3
is+S+3is+S+3is+S+3is+S+2is"
9600 PRINT A$
9610 FOR N=1 TO 4
9620 PRINT B$
9630 PRINT C$
9640 PRINT B$
9650 IF N<=3 THEN PRINT D$
9660 IF N=4 THEN PRINT A$
9670 NEXT N
9680 IF LEV=3 THEN PRINT AT 0,24
;"8is";AT 1,24;"is+6S+is";AT 2,2
4;"is+SMAUGS+is";AT 3,24;"is+ DE
N  +is";AT 4,24;"is+6S+is";AT 5,
24;"2is+S+5is"
9685 PRINT AT D,A;"*"
9690 RETURN
9900 FAST
9901 DIM L(4,7)
9902 LET A=X
9904 LET B=Y
9905 GOSUB 9950
9906 FOR N=1 TO 12
9908 GOSUB 9990
9910 LET L(X,Y)=1
9912 NEXT N
9914 FOR N=1 TO 2
9916 GOSUB 9990
9918 LET L(X,Y)=3
9920 GOSUB 9990
9922 LET L(X,Y)=6
9924 GOSUB 9990
9926 LET L(X,Y)=2
9928 GOSUB 9990
9930 LET L(X,Y)=5
9932 NEXT N
9934 GOSUB 9990
9936 LET L(X,Y)=4
9938 GOSUB 9990
9940 IF LEV=1 AND RING=0 THEN LE
T L(X,Y)=8
9942 GOSUB 9990
9944 IF LEV=1 THEN LET L(X,Y)=7
9945 LET X=A
9946 LET Y=B
9948 RETURN
9950 FOR X=1 TO 4
9952 FOR Y=1 TO 7
9954 LET L(X,Y)=0
9956 NEXT Y
9958 NEXT X
9960 RETURN
9990 LET X=INT (RND*4)+1
9991 LET Y=INT (RND*7)+1
9992 RETURN
9999 RUN
```

Biorhythms

Under the weather? Check up on your biorhythms with Patrick Garfield of Bedford.

This program uses the high resolution plotting capabilities of the Spectrum to enable you to chart your biorhythms — the biological rhythms of life which are said to help to determine your day to day physical, emotional and intellectual performance. If you have a printer, you can produce a hard copy of your results and when this becomes known you are likely to find the services of your Spectrum heavily in demand to produce printouts for friends, relations and colleagues who have previously shown little interest in microcomputing!

You may well be familiar with the basic theory of biorhythms but a little background data would probably not go amiss. Around the turn of the century a German doctor, Wilhelm Fleiss and an Austrian psychologist, Professor Herman Swoboda, working independently, discovered that certain physical and emotional problems which they observed in their patients seemed to come and go according to a regular pattern. The variation in physical symptons was found to follow a 23 day cycle whilst the emotional cycle spanned 28 days. After trying out theories on large numbers of patients they became convinced that man's physical and emotional potential varies regularly day by day according to fixed natural cycles which commence at the time of birth.

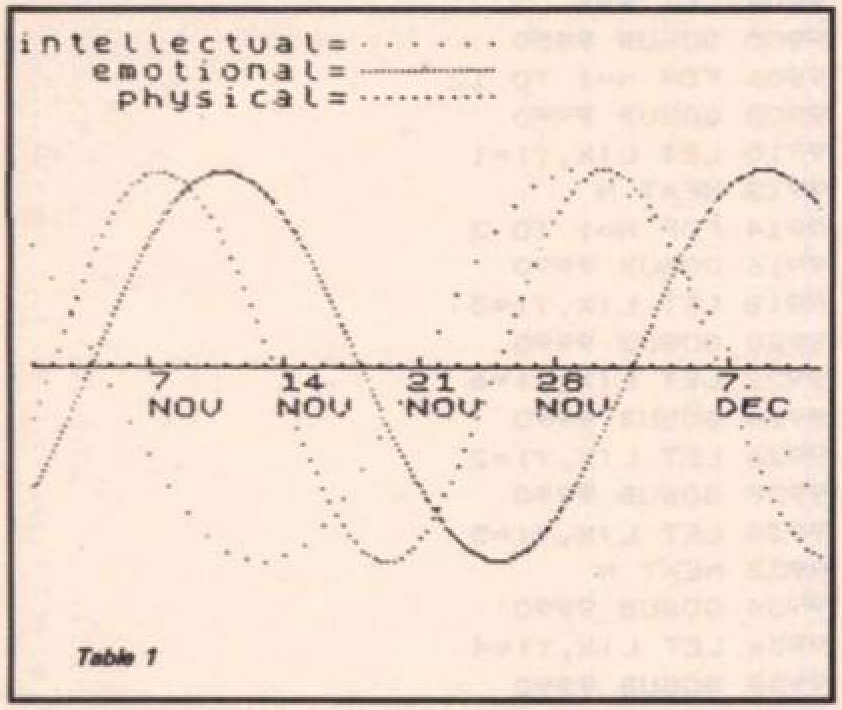


Table 1

Ups and downs

In the 1920s their theories were taken up by Dr Alfred Telscher, working with students at Innsbruck. He examined their intellectual performance over a period of time and when he collated his results he found that the declines and improvements in each student's scores followed a predictable pattern not of 23 or 28 but of 33 days. Shortly after their discovery these natural cycles were put to use both in Switzerland and in Japan to help in devising accident prevention programmes for which considerable success has been claimed. Despite this widespread public interest in their use, biorhythms were not really seen until the 1970s when further scientific investigation confirmed their existence and tables to assist in their calculation became available.

The procedure for computation is not really a difficult one. If we accept that fixed patterns of potential are set up at birth which continue throughout life, we should be able to work out a man's physical, emotional and intellectual potential for any given day thereafter. All we need to do is to find out how many days have passed since the day of birth and then use a little fairly simple mathematics to ascertain his current position in each of the cycles. This process forms the basis of the Biorhythms program.

Choose a number

Having coped with the arithmetic involved, the program allows you to present the biorhythm information in one of three ways. Options 1 and 2 produce high resolution graphs

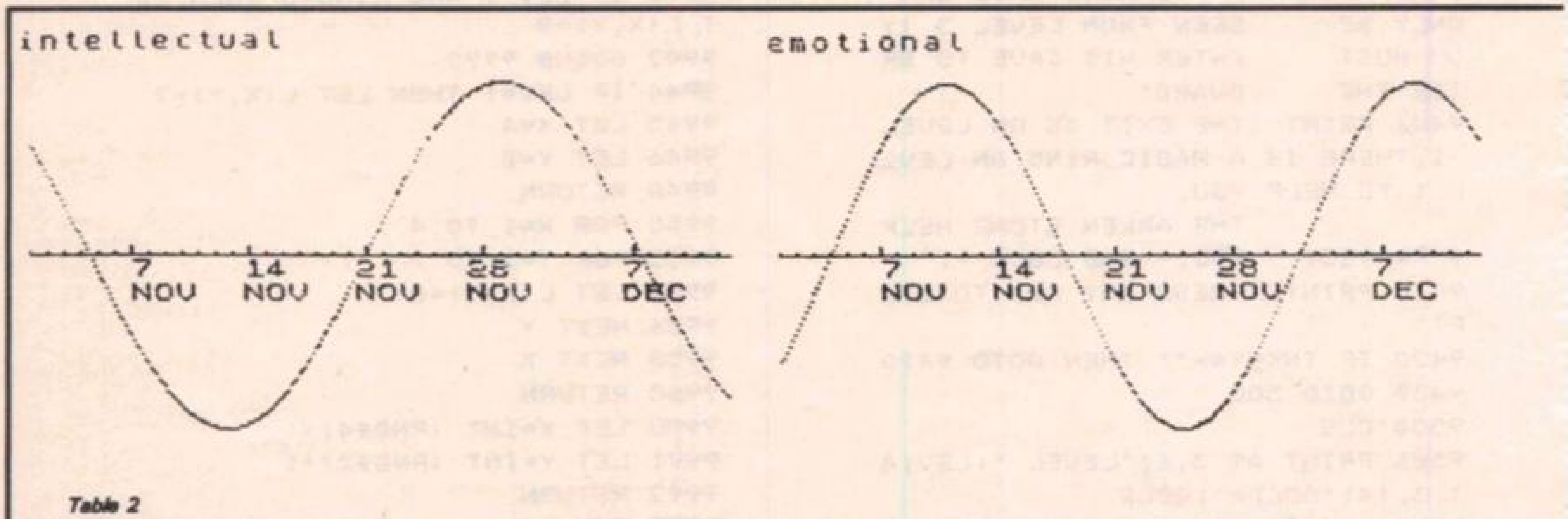


Table 2

highs and lows				
date	int	emot	phys	sig
4 -3-83	81	97	73	3
5 -3-83	90	90	88	6
6 -3-83	97	78	97	6
7 -3-83	99	62	99	5
18-3-83	-46	-98	-100	-2
19-3-83	-62	-91	-98	-3
20-3-83	-76	-79	-89	-2
20-7-83	86	97	73	4
21-7-83	75	100	88	5
22-7-83	61	97	97	4
1 -8-83	-95	-79	-82	-3
2 -8-83	-99	-91	-95	-8
3 -8-83	-100	-98	-100	-10
4 -8-83	-98	-100	-98	-9
5 -8-83	-91	-98	-89	-7
6 -8-83	-82	-91	-74	-2
15-8-83	69	78	99	2
16-8-83	81	90	94	5
17-8-83	90	97	81	6
18-8-83	97	100	63	4

Table 3

```
select option

1)intellectual  emotional  and
  physical  cycles  shown  on
  separate  graphs

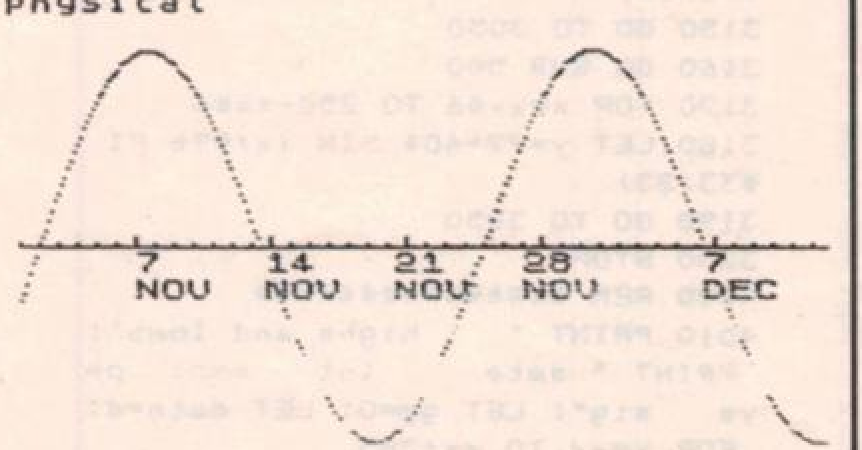
2)all cycles shown together on
  one graph

3)a list of high and low points
  for a twelve month period
```

Table 4

of your biorhythms for any month of any year you nominate, with the option to obtain a hard copy if required. Option 2 (see Table 1) displays the intellectual, emotional and physical cycles together on one graph, allowing immediate comparison whereas Option 1, (see Table 2) presents a separate graph for each of the cycles making it easier to study in detail the particular cycle in which you may be interested.

Option 3 is a fascinating, if slow moving, routine which checks your biorhythms for a whole year from the chosen date and prints out a list of those dates when all three cycles are high at the same time or when they all hit a low-point together. You will see from Table 3 that the display shows the date, followed by an indication of the height of each of the cycles on that day (where 100 is the maximum possible and −100 the minimum). The final column indicates the level of significance of each particular date. For example, a significance of 10 means that all the cycles are peaking more or less together and emotional, physical and intellectual energy available should be at a maximum (a good day for climbing Everest!) A value of 2 would indicate that all the cycles are on the high side but much less emphatic. A score of −10 shows that all the cycles are hitting rock bottom together (you might be well advised to stay in bed!)



Typing and loading

When you have typed up the program you should save it by entering GOTO 9999 unless you have a favourite save routine of your own. On loading, the program self-runs and offers the three options outlined above (see Table 4). When you have entered your selection, you will be prompted to enter your date of birth starting with the day of the month, then the number of the month, then the year. Next you will be asked to enter the month to be considered followed by the year. Options 1 and 2 begin to draw graphs on the screen, while Option 3 will start to print out its list. In this case, as it can sometimes take it a couple of minutes to wade through a whole year's calculations, the Spectrum kindly displays a little message at the end of the list to tell you which month it is thinking about so that you will know that it is alive and can follow its progress through the year. All three options offer the choice of entering "p" if you wish to dump to the printer, or just pressing ENTER if you don't.

You will see from Table 5 that the structure of the program is fairly straightforward, however, it seems to be amazingly difficult to get a computer to understand when it has to count 29 days for February with the result that some of the program lines get a bit complex.

```
      program structure
100   subroutine to draw graph
      axes
300   subroutine used in
      calulating number of days
      since date of birth
400}  subroutines used in adding
500}  titles to graphs
1000  introductory routine
2000  option 2 routine
3000  option 1 routine
4000  option 3 routine
```

Table 5

```
  10 REM SPECTRUM BIORHYTHMS @ P
.A.GARFIELD
  20 GO TO 1000
  50 DATA 31,28+(1 AND (m)2 AND
 INT (yy/4)=yy/4)),31,30,31,30,3
1,31,30,31,30,31,31
  100 REM ************
  110 PLOT x+4-xx*6,72
  120 IF x/6 <> INT (x/6) THEN
RETURN
  130 PLOT x+4-xx*6,73: LET date=
date+1
  140 RESTORE 50: FOR q=1 TO m: R
EAD c: NEXT q
  150 IF (m=2 AND ( INT (yy/4)=yy
/4)) THEN LET c=29
```

```
  160 IF  NOT ( INT ((date-1)/7)=
(date-1)/7 AND date>1) THEN  GO
TO 190
  170 FOR w=72 TO 75: PLOT x+4-xx
*6,w: NEXT w
  180 IF (x-xx*6)/8<28 THEN  PRIN
T  AT 13,(x-xx*6)/8;date-1: PRIN
T  AT 14,(x-xx*6)/8;A$((m-1)*3+1
 TO m*3)
  190 IF date>c AND  NOT ( INT (y
/4)=y/4 AND m=2) THEN  LET m=m+1
: LET date=1
  200 IF date>c+1 THEN  LET m=m+1
: LET date=1
  210 RETURN
  300 REM ***************
  310 RESTORE 50: LET mo=0: FOR s
=1 TO m-1: READ q: LET mo=mo+q:
NEXT s
  320 LET ye=(yy-1900)*365+ INT (
(yy-1901)/4)
  330 LET t=d+mo+ye
  350 RETURN
  400 FOR a=0 TO 40 STEP b: PLOT
108+a,173-c: NEXT a: RETURN
  500 PRINT  AT 3,0;b$((ww-1)*12+
1 TO (ww-1)*12+12): RETURN
 1000 REM **************
 1010 CLS
 1020 LET A$="JANFEBMARAPRMAYJUNJ
ULAUGSEPOCTNOVDECJANFEB"
 1030 LET b$="intellectualemotion
al  physical    "
 1040 PRINT "select option"'"1)i
ntellectual  emotional  and   p
hysical  cycles  shown  on    s
eparate  graphs"''"2)all cycles
shown  together  on   one graph"'
'"3)a list of high and low point
s   for a twelve month period"
 1050 INPUT dd
 1060 CLS
 1070 INPUT "day of month born ";
d
 1080 INPUT "month ";m
 1090 INPUT "year ";y: LET yy=y+(
1900 AND y<1900): GO SUB 300
 1100 LET dob=t: INPUT "enter mon
th for calculation ";v: LET m=v
 1110 INPUT "year ";y: LET yy=y+(
1900 AND y<1900): LET u=1: LET d
=1: GO SUB 300
 1120 LET new=t
 1130 LET dif=new-dob
 1140 LET xx=dif
 1150 LET ww=1: IF dd=1 THEN  GO
TO 3000
 1160 IF dd=3 THEN  GO TO 4000
 2000 REM ***************
 2010 PRINT  AT 0,0;"intellectual
=": LET b=8: LET c=2: GO SUB 400
 2020 PRINT "    emotional=": LET
b=2: LET c=10: GO SUB 400
 2030 PRINT "     physical=": LET
b=4: LET c=18: GO SUB 400
 2040 LET date=1: LET xx=dif
 2050 FOR x=xx*6 TO 250+xx*6
 2060 LET y=72+60* SIN (x/99* PI
)
 2070 IF x/6= INT (x/6) THEN  PLO
T x+4-xx*6,y
 2080 LET y=72+60* SIN (x/99* PI
/23*33)
 2090 IF x/2= INT (x/2) THEN  PLO
T x+4-xx*6,y
 2100 LET y=72+60* SIN (x/99* PI
/28*33)
 2110 PLOT x+4-xx*6,y
 2120 GO SUB 100
 2130 NEXT x
 2140 INPUT "enter P to print";v$
: IF v$="p" THEN  COPY
 2150 STOP
 3000 REM *****************
 3010 GO SUB 500
 3020 LET date=1: LET xx=dif
 3030 FOR x=xx*6 TO 250+xx*6
 3040 LET y=72+60* SIN (x/99* PI
)
 3050 PLOT x+4-xx*6,y
 3060 GO SUB 100
 3070 NEXT x
 3080 LET date=d: LET xx=dif: LET
 m=v
 3090 INPUT "enter P to print";v$
: IF v$="p" THEN  COPY : LPRINT
: LPRINT : LPRINT : LPRINT
 3100 CLS : LET ww=ww+1
 3110 GO TO 3040+ww*40
 3120 GO SUB 500
 3130 FOR x=xx*6 TO 250+xx*6
 3140 LET y=72+60* SIN (x/99* PI
*33/28)
 3150 GO TO 3050
 3160 GO SUB 500
 3170 FOR x=xx*6 TO 250+xx*6
 3180 LET y=72+60* SIN (x/99* PI
*33/23)
 3190 GO TO 3050
 3200 STOP
 4000 REM ****************
 4010 PRINT "    highs and lows":
 PRINT " date     int    emot   ph
ys   sig": LET gg=0: LET date=d:
 FOR x=xx TO xx+365
 4020 PRINT  AT 2,0;A$(3*m-2 TO 3
*m)
 4030 LET gg=0: LET date=d
```

```
4040 FOR x=xx TO xx+365
4050 LET aa= SIN (x* PI *2/33)
4060 LET bb= SIN (x* PI *2/28)
4070 LET cc= SIN (x* PI *2/23)
4080 RESTORE 50: FOR q=1 TO m: R
EAD c: NEXT q
4090 LET ch=0
4100 IF (m=2 AND ( INT (yy/4)=yy
/4)) THEN  LET c=29
4110 LET date=date+1
4120 IF date>31 AND m=12 THEN  L
ET m=1: LET date=1: LET yy=yy+1:
 LET ch=1
4130 IF date>c AND  NOT ( INT (y
/4)=y/4 AND m=2) THEN  LET m=m+1
: LET date=1: LET ch=1
4140 IF date>c+1 THEN  LET m=m+1
: LET date=1: LET ch=1
4150 IF (ch=1 AND gg<20) THEN  P
RINT  AT gg+2,0;A$(3*m-2 TO 3*m)
4160 IF (aa+bb+cc<2.4) AND (aa+b
b+cc>-2.4) THEN  GO TO 4300
4170 LET gg=gg+1
4180 PRINT  AT gg+1,0;date; TAB
2;"-";m;"-";yy-1900;" ";
4190 IF aa<0 THEN  PRINT  TAB 10
;"-";
4200 PRINT  TAB 11; ABS ( INT (a
a*100));
4210 IF bb<0 THEN  PRINT  TAB 16
;"-";
4220 PRINT  TAB 17; ABS ( INT (b
b*100));
4230 IF cc<0 THEN  PRINT  TAB 22
;"-";
4240 PRINT  TAB 23; ABS ( INT (c
c*100));
4250 IF cc<0 THEN  PRINT  TAB 29
;"-";
4260 LET ee= ABS (aa+bb+cc)-2.3:
 LET ee= INT (ee/7*100+.5): PRIN
T  TAB 30;ee
4270 IF gg<20 THEN  GO TO 4300
4280 INPUT "enter P to print";v$
: IF v$="p" THEN  COPY
4290 LET gg=-2: CLS
4300 NEXT x
4310 INPUT "enter P to print";v$
: IF v$="p" THEN  PRINT  AT gg+2
,0;"    ": COPY
4320 STOP
9999 SAVE "BIORHYTHMS" LINE 1: P
RINT "VERIFY": VERIFY "BIORHYTHM
S": CLS : PRINT "O.K."
```

Is this a Quantum Leap?



ZX Computing was at the QL launch in January and a very enlightening occasion it was too. Simon Rockman has taken a quick look at the latest machine to be unveiled by Sinclair.

As Sir Clive pointed out, Sinclair Research has a larger share of its homemarket than any other manufacturer in the world and that market has the greatest number of home computers per capita. This is an excellent base from which to be ambitious, and the QL certainly is that. Based on one of the most powerful CUP (Central Processing Unit) chips around, the name Quantum Leap may not be modest but it is certainly justified.

Like all Sinclair machines, the QL is small — 47 by 14 cm and 5 cm deep (19" by 6" by 2") and light, just over 1kg (3lbs). It has a proper, full 65 key QWERTY keyboard with a good feel and the L shaped ENTER key is much larger than the others. For the first time Sinclair have done away with the single key entry system. To the left of the main keyboard are 5 function keys and to the right are two of the new QL microdrives.

Currently these are the only available way of storing data — Sinclair argue that a cassette interface is out of place on a machine of this power. However, the tape cartridges are expensive and will bump up the price of games. A prototype hard disc has been developed but is a long way from being ready for production and will certainly be expensive. The new microdrives are a development of the ZX version and although they take the same cartridges, they are not compatible with theSpectrum. QL microdrives are supposed to be more reliable, guaranteeing 100K as opposed to the 85K from ZX microdrives.

This improvement has been achieved at the expense of speed and by using an improved design involving new, custom chips. Up to six extra microdrives can be added but even this 800K of storage is a bit feeble for a machine which will be expandable to 640K when the promised ½Mb rampack becomes available. The other option open to software houses is to use cartridge ROMs, which although they look the same, are also not ZX compatible. On a large scale, these may be cheaper to produce but the initial cost is much higher and they only hold 32K.

Initially the QL looks as though it will be VERY fast: it has a clock speed of 7½Mhz and 32 bit internal registers. The 68008 only has an 8 bit data bus, which although slower because it has to do two accesses for each operation, allows the cost of the other chips to be kept down. This is part of the secret of the QLs low price. The 68008 has an extremely powerful instruction set including multiplication, division and string handling. It can also detect some errors itself rather than crashing.

At the launch it was said that as yet no games had been written for the QL but when people get down to it there should be some very spectacular games produced. The graphics resolution is 512 by 256 with 4 colours or 256 by 256 with 8 colours: the manual points out that this resolution allows colours to be mixed and with the stipple effect and flashing option you can have quite a variety.

The machine itself is stunning value but given that it comes with exceptionally good software, comprising a wordprocessor (QL Quill), database (QL Archive), spreadsheet (QL Abacus) and graphics package (QL Easel). These alone would cost at least £400 as a set so they go to make the QL a positive bargain as well as practical.

At the time of writing (late January) we have not yet had a machine for review, indeed as far as we know, the BASIC (a very powerful implementation called Super BASIC) is not yet finished. So we have no means of coming to a totally accurate conclusion. But with a 68008 plus a second 8049 processor to handle sound and various housekeeping jobs it should be good. If the flat screen TVs are anything to go by, Sinclair are getting better at keeping delivery promises but a letter dated 13th February stated that deliverycould bedelayeduntil the end of Aprilso they'restillfar from punctual. I've ordered two, one at the start of the launch. Does that make me the first individual to order one? Roll on delivery.

More software from Sinclair

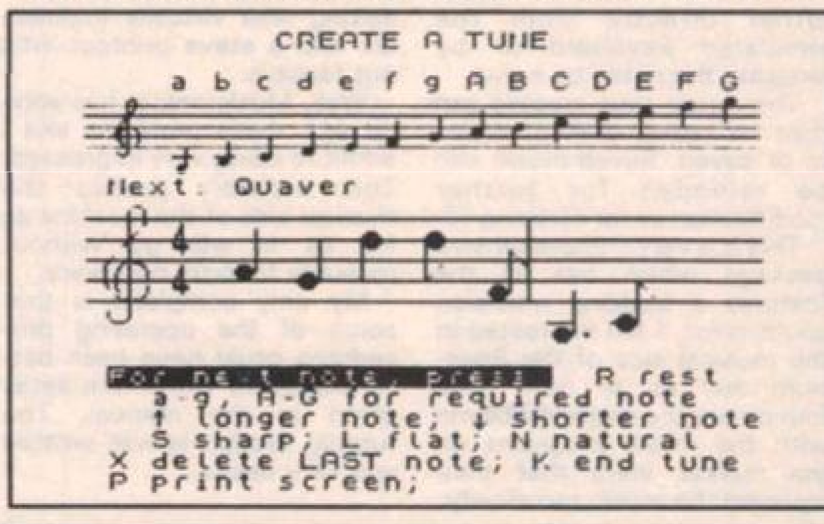
Two interesting packages have recently arrived from the Sinclair stable, called "Beyond Basic" and "Musicmaster" both written by Incentive Software Ltd. Both programs were packaged in an eye-catching box with a slim instruction booklet.

Beyond Basic is designed to teach and explain the workings of your micro and simple machine code programming. The manual is brief and is obviously intended to be that way to encourage the user to work through the program.

One fascinating feature is the experimental stage which lets you write your own Z80 assembler programs and then displays the effects on screen.

The concepts are simple and, as the manual says, the aim of the program is to make learning easy. I let an associate try it out in a school and he said that it was an excellent introduction to the subject for his computer studies class.

Musicmaster also has a piano key and operating key overlay for the keyboard. The program is designed to enable you to create your own tunes, but gives you two options:



In .... Brief

• Picturesque who sell the widely acclaimed Spectrum Editor/Assembler and Monitor, have re-written both programs and they now contain commands making full use of the microdrives, network and RS232 facilities.

The new version will work with both tape and Microdrive systems and the price remains the same, £8.50 for the Assembler and £7.50 for the Monitor.

If you already own these programs and want to upgrade to the new versions, then Picturesque will replace them for £1.50 each if you send the earlier versions back to 6 Corkscrew Hill, West Wickham, Kent BR4 9BB.

• Elephant Software, well known for their range of mind-stretching puzzle and strategy programs, have ventured into the world of arcade style graphics. However, their new program, 'Kosmik Pirate' is predominantly a strategic enactment game.

With your on-board computer flushing out space craft in the outer orbits of earth, you try to wreak havoc among the other space travellers. Many and varied are your problems, including a mutinous alien crew.

Kosmik Pirate can be trapped at 41 Haymill Road, Burnham, Berks SL1 6NE for £5.65.

• Moon Buggy, Sci File and 1994 (Ten Years After) are the latest Spectrum offerings from Visions, a company which has gained a large following in a short time.

Sci-File is an interesting looking program for the serious programmer and is described by Visions as a program generator that will teach you how to program and then help you apply it to any project you wish — from home computing to meal planning.

At £24.95 for Sci-file you've got to be serious!

• Hello and welcome to W D Software who have produced their first offering, 'Tradewind' for the 48K Spectrum. This is described as a graphic adventure trading game and is available from Hilltop, St Mary, Jersey, Channel Islands for £5.00.

Although a new company, the writer, owner/proprietor, Mr C C Wilton-Davies has already marketed a program through Workforce called 'Do Not Pass Go'.

• Hot on the heels of Vampire Village and Space Island, Terminal Software have released 'City', another in their series which they describe as "exciting real time adventures".

• Shakin' Stevens' latest cassette LP, "The Bop Won't Stop" contains a Spectrum program at the end. Despite the publicity, I wouldn't recommend buying it just for the game — a variation of the old "Dodge 'em" game of which many mags (including ZXC) have published versions.

True, the game is in m/c and at the hardest level is impossibly fast, but just consider it a bonus if you are already a Shakey fan. (Modesty forbids me to mention that I used to know Shakey in the "Sunsets" days!)

either directly from the simulated keyboard or by entering the notes by name.

The music thus created can then be heard, altered, added to or saved. Saved music can be reloaded for further modification or for listening to.

This is a very comprehensive package which has all the features a budding musician could want. I am interested in the musical side of the Spectrum and up to now have found that the major problems with the music programs on the market were that they replayed the music too slowly, editing was virtually impossible and a stave printout was not feasible.

Well, Musicmaster has solved ALL these problems and I admit to being very impressed. This probably pushes the musical side of the machine as far as it will go without recourse to extra hardware.

My only complaint is that some of the operating procedures could have been better explained with more detail given in the manual. The tutorial section is well written and verv useful.

Building on success

It seems that Sir Clive isn't just concerned with making successful computers, even his buildings are winning awards these days! Sinclair's new £750,000 computer centre in Cambridge has recently been awarded a major commendation from the Buisness and Industry Panel for Enviromental Award 1984.

The centre was purpose-planned for Sinclair and combines Cambridge traditions with innovations in architectural design, interior furnishing and enviromental control systems. As can be seen, traditional brickwork is combined with stainless steel and glass to give the centre a very modern look. The yard, between the building and the outhouses, has been transformed into an enclosed atrium.

One of the most interesting features of the building is the intregrated control system which is based on an original well. This, together with a second borehole, supplies water at a constant 12°C all year round. Supported by a solar energy facility in the central court, the whole microprocessor controlled system automatially selects the most effective and energy efficient heating method, switching between electric heat machine/thermal store and gas boiler. This system also controls all lighting.



Alchemist drives you Stonkers!

Releases from Imagine are events worth noting and two eyecatching packages arrived recently in the ZX office. Both are for the 48K Spectrum and are priced at £5.50. I ran both programs through my machine briefly and that was enough to see that they are both superb games which will need a lot of playing before being mastered.

Stonkers is a war strategy game which uses graphics and an element of arcade action. It is probably the closest implementation so far on the traditional wargames theme. Written by John Gibson

(ZZOOM and Molar Maul) the scene is a map of a coastline with two opposing forces of equal strength on either side of a river mouth.

Deployment of your forces amidst mountains, plains and marshland in an effort to capture the enemy (the computer) port and HQ while defending your own, is a complex task with thousands of variations. Not a five minute zap game but one which I found fascinating and hard to tear myself away from to write this item!

Alchemist is Imagine's version of an arcade adventure game. Many companies have attempted this with varying degrees of success: The Hobbit was a superb text game with graphic pictures, Valhalla animated the graphics, Halls of the Things and Lunar Jetman were arcade games with a quest. The first class graphics make this an outstanding game and, remembering that I only had time for a quick look, the theme and locaions appear involved enough to ensure a lot of playing.

The plot puts you in control of the alchemist who has to search for four pieces of a hidden scroll which will unlock his powers to slay his enemy, the warlock. The Alchemist has the power to transform himself into an eagle and fly — impressive stuff from Ian Weatherburn (Zip Zap).

I will get our regular reviewer to look at these in more detail but meanwhile check them out at your nearest stockist!





In . . . . Brief

• Microsphere have sent us their latest game, 'Wheelie' to review. Selling at £5.95, it is a drive-your-bike-avoiding-and-jumping-over-hazards type game.

What makes it special is the impressive motorcycle graphics, especially the variety of crash sequences. My family loved this one and it is this month's Editor's family favourite.

• Two new programs have arrived from Incentive Software: 'Mountains of Ket' is the first in a three part series of traditional text adventure games. I wandered round the opening scenes but met my demise soon after, another one for adventure fans to check out.

The other is 1984, fancy being Mrs Thatcher? (I'm sure there's a joke in there somewhere!) This simulation game gives you the chance to rule the country, a sophisticated version of the old 'Kingdoms' game. Both games cost £5.50 from 54 London Street, Reading RG1 4SQ.

• Probably the most unusual program to arrive is 'Diabetes', the first in a series for the Spectrum entitled 'The Positive Health Programs' from Dunitz software.

Intended to help diabetics understand all about the subject and how to keep it under control, one side is for insulin users and the other side for those who are not.

Using graphics and a question-and-answer technique, this is a really helpful program which could have a use in schools for health education.

• Superleague is a program released by Cross Software of 37 Langford Crescent, Barnet, Herts EN4 9EH for £6.50.

The company claims that it is the most sophisticated simulation of its type, containing a full 22 team league and 42 match season . . .

• Fawkes Computing is another new company which we welcome to the fold. Their first release is Gamestape 1 for the 16K ZX81 and contains four games for £4.95. I have sent this tape on to our reviewer for a proper assessment in the next issue.

Booked!

Puffin publishing company have launched an interesting series of books accompanied by tapes with Spectrum programs. The programs complement the science fiction stories which are of the fast-action adventure type. Three books/tapes form a series called 'The Korth Trilogy' written by PK McBride, another ex-teacher seduced by the lure of the micro.

Involvement is the name of the game as you journey beyond the outer limits to join the members of Interplanetary Patrol in their fierce and ingenious battle against the mighty Korth empire. Each pack contains an illustrated book and cassette with three individual programs apiece.

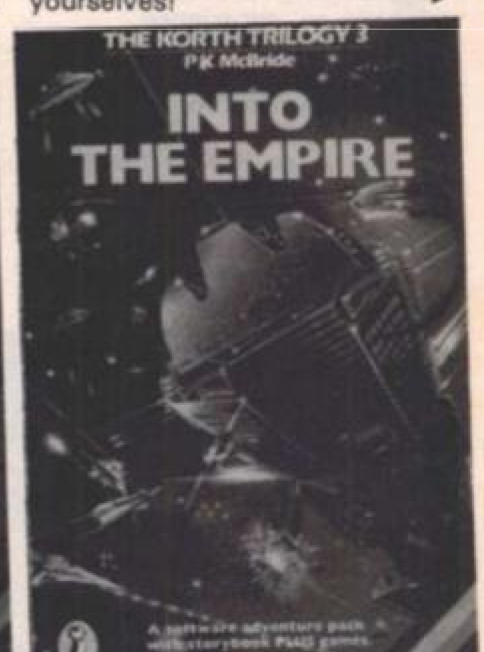
The titles are 'Escape from Arkaron', 'Besieged' and 'Into the Empire' and are reasonably priced at £4.95 each. 'The Warlock of Firetop Mountain' is the fourth title, a number one children's bestseller which has already sold a quarter of a million copies. This book was a good attempt to emulate the cult role-playing game of Dungeons and Dragons where the reader turns to different pages depending on a choice of actions he can make.

The tape admirably complements the book, being a variation on the program voted by James Walsh as his favourite 1983 game, Halls of the Things by Crystal Computing. The game involves negotiating a maze in real time, finding the hidden keys and defeating the multitude of fiendish monsters.

This is sold as a book/tape pack for £6.95 or as a tape only for £5.50. I am wholeheartedly in favour of encouraging the art of reading and recommend you look these packs out and see for yourselves!







In .... Brief

• ZX81 owners are also remembered by Software Farm, Freepost (BS3658)A, Bristol BS8 2YY who have produced a hi-res graphics game to run on the standard 16K ZX81, no hardware needed.

With a screen resolution the same as that of the Spectrum, Forty Niner is a challenging 'Miner' type game and costs £4.95.

• A set of computer related mystery adventure story books have been marketed by Armada. This is an unusual venture which features two boys (wot no girls!) who solve mysteries with the aid of a computer.

The gimmick is that programs are given which the reader can enter on his own machine (they are compatible with most popular computers) to solve it himself.

At £1.25 each this could be a useful bait with which teachers can encourage reluctant readers in their thankless battle against illiteracy. The name? 'The Bytes Brothers', what else!

• Another well established name, Quicksilva, recently launched a new range of games. Four of these are for the Spectrum and include the titles, Dragonsbane, Fred, Lazerzone and in complete contrast, The Snowman, based on episodes from Raymond Briggs' best-selling book. (I wonder what the chances are of ever seeing Fungus the Bogeyman on our television screens?)

First of a series?

As one company collapses, another rises. Soft Shop, who have opened their first shop at 55 St Peters Court, Chalfont St Peter in Buckinghamshire, are rising.

The shop will stock in excess of 1,000 popular computer programs for the major computers, together with books, blank data tapes, leads, joysticks and a host of other accessories. It will also provide opportunity for shoppers to get 'hands on' experience.

Stuart Kotchie, the mangaging director, said "there is a desperate need for specialisation of this kind, computer hardware outlets do not have the experience of fast moving consumer goods'.

But why Chalfont St Peter? 'We chose it as a launch pad because our research shows a high percentage of home computer owners in the surrounding areas. People are prepared to travel quite some distance to get what they want.'

Stuart has a lot of experience in retailing and actually encourages customers to try out programs before buying. His staff for this (and all other branches to be opened) will be chosen from the locality in which the shop is set and they will be computer enthusiasts who will be trained in a very special way to meet the need of a Soft Shop.

We look forward with interest to finding out the locality of the next shop in this chain. Will it become a chain store rival to Marks & Spencer?



A twosome from Hewson

Hewson Consultants have not forgotten that many Spectrum owners are using 16K and their latest releases are Nightflight II and 3D Seiddab Attack (I wonder if the fact that Seiddab spelt backwards is Baddies has any significance!).

In my usual curious way I tried both games and, as is to be expected from a company with the experience and reputation of Hewson, was impressed with both of them. (Believe it or not, I do actually dislike some games, it's just that the standard seems to be very high recently.).

Nightflight II is an enhanced version of their previous game Nightflight (surprise, surprise). This improved version contains a shifting perspective which shows the correct view of runway lights and surrounding hamlets from whichever direction the airfield is approached, and the engine sound is more realistic, varying with the engine speed.

A printer copy of your performance rating is also available after each flight. Mike Male, the author, is a keen pilot and is an air traffic controller by profession!

3D Seiddab Attack is a very impressive 'shoot the aliens game', the graphics are excellent and the 3D effect is obtained by use of perspective. You are a tank driver moving through city streets trying to destroy alien craft which swoop and attack you. Great screen display and I found it very addictive; two more for our lucky reviewer!

Nightflight II and 3D Seiddab Attack run on any Spectrum and cost £7.95 and £5.95 respectively.

A quest is over

Adventure games have a following which is so strong that a magazine dedicated solely to them has been marketed. If you are a bit like me, get so far then get stuck and somehow never seem to be able to find the time to go back to it, it is heartening to hear that someone manages to complete a game!

Hewson Consultants' adventure, 'Quest' has been cracked by Frazer Hubbard, a fifteen year old from Godhurst in Kent. Andrew Hewson, head of the company and microcomputer expert, was amazed that it only took him about six weeks to complete. "We expected that it would take someone at least six months to unravel Quest, so we were very surprised when Frazer rang the office and proved he had completed it by revealing the ending".

Frazer spent many hours involved in the game during the school holidays and his concentration on the game probably meant that he made fewer mistakes than might be expected. He bought his Spectrum with some of the money from a compensation award he received because of an accident last year when he was knocked off his bicycle. Frazer is at present studying for his O levels, one of which being Computer Studies and hopes to start a career in computer programming.

Frazer's family are all interested in computers, but he has run ahead of the rest of the family and become the household expert. He prefers to play adventure games, finding them "better and more interesting than arcade games" and says that he is looking forward to the launch of the next Hewson adventure game, Fantasia.

Although Frazer admits that he had a little help from the Hewson office, the majority of the game and the final stages were solved by himself. His verdict: "Quest is hard, but not too difficult to make you give up, you have to use the



TV or not TV

Sony is one of the few to acknowledge the existance of the computer with the production of their KV1430 Trinitron 14" Colour TV. It is designed with a special RF computer connection socket at the front of the set which is pre-tuned to a special button.

The styling of the set is also better for computists as it has a vertical screen which is raised a few inches from the base to allow the computer or games console to sit in front without obscuring the screen.

Well worth considering when the pressure between computer and family TV is too great, although the price of £249.00 seems a little expensive for a second set.

In .... Brief

- Two of the speech units on the market are likely to lose their voices. Timedata's speech units ZXM and ZXS are being discontinued. When asked by yours truly "why?" Timedata replied "No reason . . ."

  The other unit likely to disappear is the Computer Add Ons' SS1 Speech Synthesiser, the manufacturing company is no longer producing them. An Add Ons' spokesman said that they were "considering alternatives."

- The ZX LPRINT Centronics printer interface for the Spectrum from Euroelectronics is now being supplied compatible with the Sinclair Interface 1 and Microdrives. Don't despair if you already have the ZX LPRINT Mk1 or Mk2, they will supply you with a conversion kit to ensure compatibility.

  This conversion consists of a miniature switch in one of the connections which you can fit yourself for £1.90, or, if you're like me, get fitted for £3.25 by Euroelectronics at 26 Clarence Square, Cheltenham, Gloucester GL50 2JP.

- Ceran Software, producers of the ZX81 monitor have announced the arrival of a monitor for Spectrum owners. Further details can be obtained from Ceran at 9 Parliament Road, Thame, Oxon.

- Ed's Tip: Keep an eye open for Morex peripherals, I hear a rumour that they are developing a 5.25" disc drive package for the Spectrum priced around £220.00.



clues you're given and look for the simple solution instead of complicated answers. Quest has a lot of red herrings."

Finally, a quick tip: "Keep the ring, but pick up and drop the golden chalices".



The key to success?

Transform Ltd, well known for their range of business software, have ventured into the field of Spectrum add ons with the launch of their professional keyboard. Up until now you had a choice of keyboard with a copy of the Sinclair keys and a numeric keypad (DK'Tronics) or a keyboard modified to simulate a typewriter key layout with a full sized space bar (Fuller).

Transform have combined the two and produced a keyboard which they claim is suitable for everyone's need; home, accountancy and word processing.

The keyboard has been designed to incorporate the micro-drive, a centronics interface and the power supply. It has 59 keys including the full sized space bar, a large ENTER key and a numeric keypad. "E" mode can be accessed by a special single key and a decimal point key is supplied on both the numeric and the ▶

normal keypads.

One very useful feature is an on/off switch with a LED attached. Installation is supposed to be easy, no soldering is required. I phoned Transform and was told that they have had a good response to their adverts so far. Their output is a modest 100 per month, but they already have plans to increase this.

When we receive a model for review we will give you more details, but meanwhile you can get one from Transform Ltd, 41 Keats House, Porchester Mead, Kent. A little more costly than its rivals, the keyboard will set you back £69.95 plus £2.00 postage and packaging.

A Byte in time

Fed up with waiting for the Microdrives to become available in the shops? Need fast access, mass storage? Perhaps the new Byte Drive 500 units might be worth a look. These are floppy disc drives using single sided, double density 3" CF Compact Floppy Discs with a formatted capacity of 220K per side in 11 sectors. This gives a total of 440K and typical access time to files is 3ms.

The unit is housed in a tidy case measuring 73.5mm high, 152mm long and 124mm wide. Double sided drives and extending the capacity to 1M are planned developments during the year.

The system, developed by ITL and Tyrell Systems, is unusual in that the conventional and cumbersome interface card which would normally connect the computer to the disc has been eliminated and has actually been built into the cable itself.

This cable contains all the disc control hardware and incorporates a 1.5"x2" plastic block moulded to a 34 way IDC connector. The company writes; "The moulded block encapsulates a custom hybrid on a ceramic substrate, which embodies all the control circuitry needed for the Disc Operating System", so now you know: my head aches!

Furthermore, the main components are a ULA, 16K ROM and a Disc Controller Chip. A power supply unit is supplied in a matching case, and a manual is available. Upgrading to 5.25" drives is also planned for the future. Initially produced for the Oric, cables for the BBC and the Spectrum followed and should be available now.

Oh, just one minor thing, it will cost you £260+VAT for the complete package of Hybrid cable, drive, power unit, DOS Disc, Manual and power supply cable.



A strategic win

It seems to be the season of winners and personalities! The winner of the 1983 Cambridge Award was Mark Lucas, a commercial analyst from IBM. This award is sponsored by software houses, Cases Computer Simulation and Sinclair User magazine and is intended to encourage intellectually stimulating games programs for the Sinclair computers.

Mark won £1000 for his original strategic wargame for the Spectrum, 'Battle 1917' which is now marketed by CCS. Second and third prizes for the Spectrum section were won by M Wheeler and N Holgate for their programs, 'War 70' and 'Oligopoly'. The second and third prizes in the ZX81 category were the graphic adventures 'Broodslayer' and 'Barrows Quest'.



Chat up your Spectrum

Orion Data Limited, a Brighton based company, have made a development which they claim could be, "as significant as the advent of home computers themselves". Heady stuff! So what is it?

Enough of the suspense, its a low cost Speech Recognition Unit which they reckon is probably the first of its kind in the world. I wonder what William Stuart Systems Ltd will have to say about that, as they have had a similar unit on the market for the last year or so at £49.00!

But back to the Orion unit, called the "Micro Command". It transmits commands spoken into a microphone into signals instantly obeyed by the computer. A voice print is taken of each new operator so that it doesn't matter what accent, vocal pitch or pronunciation you use, the unit will recognise it. This also means that you can control it in any language so it has international appeal.

Orion suggests that it is initially best to use the Micro Command to replace manual keyboard or joystick control in computer games, especially the more strategic types.

The price is £49.95 for the complete set of Speech Recognition Unit, instruction leaflet, microphone and cassette which includes a free game. The whole lot is supplied in a 'gift' type box from Orion Data Ltd, 3 Cavendish Street, Brighton, East Sussex.

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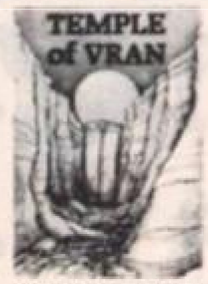
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INCENTIVE SOFTWARE LTD, 54 London Street, Reading RG1 4SQ Tel: Reading (0734) 591678

Christopher Columbus would have had an easier life with Eric Hutchinson's program.



This program was designed by Eric as a specialist program for yacht sailors to practice their navigation, but it impressed me as being of great educational use and also makes a fascinating simulation.

If you fancy your hand at round the world sailing, try this program first! I'll let Eric tell you about it.

This is a navigation program designed for use by small yachts.
It is menu driven and has the following facilities:

1 Course and distance from a choice of present position, last fix or estimated position.
2 Estimated position from course and speed entered in response to prompts.
3 Fix from horizontal sextant angles.
4 Keeps a constant record of the destination which may be changed at any time.

In use, the program works as follows:
The landmarks or beacons are entered into the array in response to prompts. The program is then saved to tape. On reloading the program the beacons are available for position fixing. First, a course is asked for and the present position and destination entered. A course and distance is then produced. This is used by the program to find the estimated position at any time. When a fix is required the beacons to be used are entered from left to right. The program will then ask for the left hand side horizontal angle and then the right hand side. The program then displays the position by bearing and distance from the centre beacon and as Latitude and Longitude. It will also update the arrays.

To use the program

On any spare evening set up your ZX81 and load the program. Get out the charts of your cruising area and pick out suitable landmarks for taking bearings. Write down the latitude and longitude of each, numbering them from 1 as you go. For convenience, the numbers could also be written alongside the landmarks on the chart.

Follow the instruction for entering beacons (as I call all landmarks) and when you have finished, list the beacons and check all have been entered correctly. If all are correct place a new, good quality cassette in the cassette recorder. Plug the connecting wire into the sockets marked Mic, in the cassette recorder and in the ZX81, and follow instructions to save to tape. This cassette now holds the fixing system and all the beacons you have entered.

Before the cruise

Set up the ZX81 and load your new cassette program. During the cruise pick three suitable



beacons and enter their numbers from left to right as seen from seaward. Enter your horizontal angles and remember to press NEWLINE after each entry. The screen will show your present position as a bearing and distance from your centre beacon and as a Latitude and Longitude.

If at any time you see a mark you can use, which is not on your list, simply go to (E to enter beacons) and enter lat and long remembering to keep a note of the number, write it alongside the mark, then list the beacons and check that the number is correct. If you have entered extra beacons during a cruise then follow the instructions to save to tape before switching off.

A few comments

One or two points may be of interest:

1 The program was designed for the yachtsman to use rather than the computer hobbyist. To this end, as far as possible, I have tried to ensure that there are no breaks in the program.

2 In order to disable the break key all entries are strings backed by error catching routines.

3 Lines 5 to 40 check that the entry is a number, and reject anything else except a decimal point.

4 The PEEK in line 615 uses an unused variable to direct the course and distance routine to prompt for initial position. It is POKED on first loading the program.

5 In line 841 code T$ is used as I found that . . . . if T$ = ... does not work if the T$ (array) is empty.

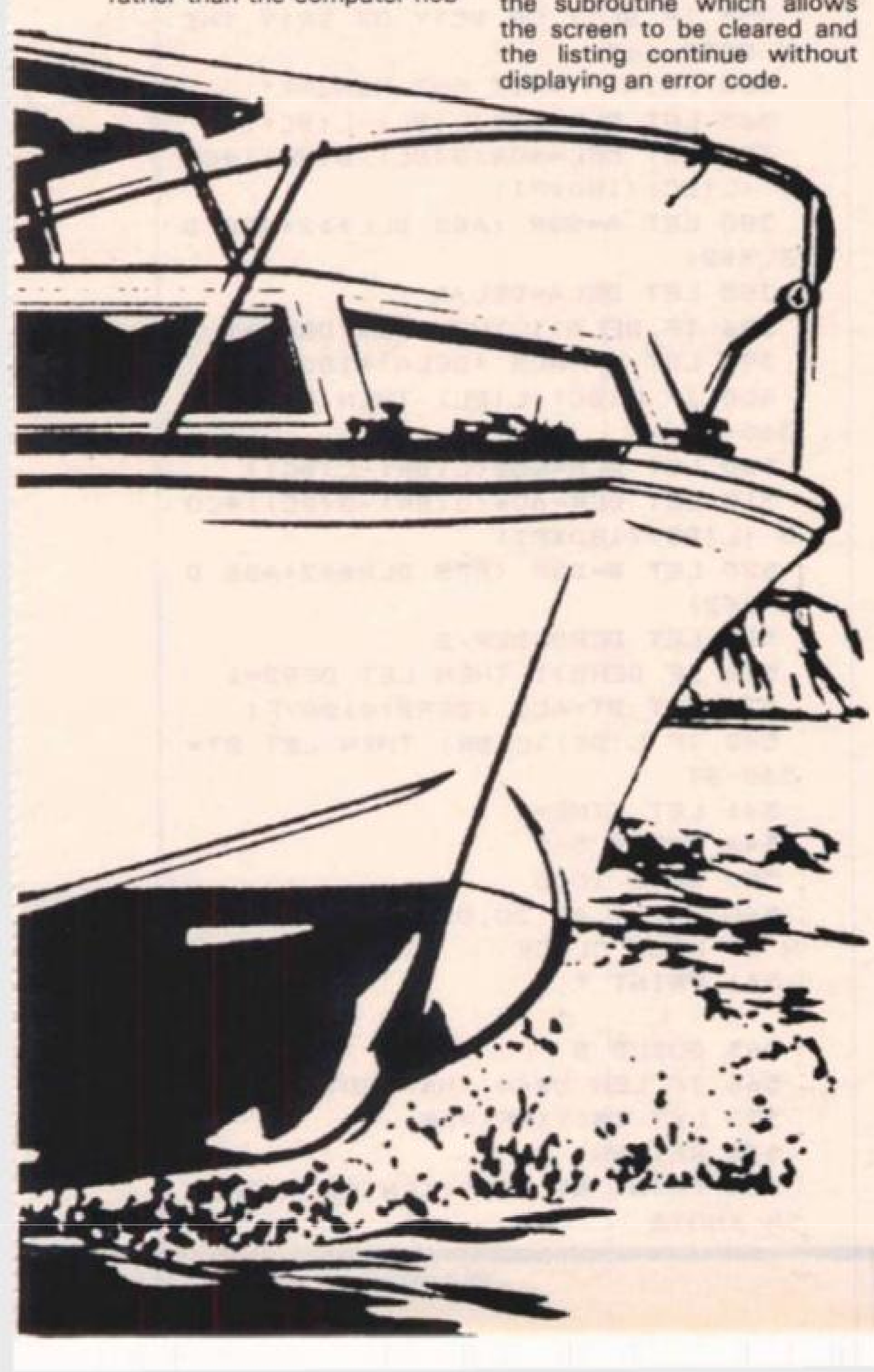
6 Lines 1200 to 1210 change the mathematical angle which is measured from the X axis anticlockwise to a true bearing which is measured from the Y axis clockwise.

7 The PEEK in line 3130 checks the number of lines left in the display file and goes to the subroutine which allows the screen to be cleared and the listing continue without displaying an error code.

8 In lines 386 and 526 I found that in some circumstances the result could be > 1 thus giving an error code as no angle has a cosine > 1, hence these corrections.

Naturally, there is a great deal more that could be done but I feel that, in BASIC, the program is reasonably complete.

To develop the idea further, I am currently working on a machine code program which will take data direct from various sources and produce a continuous estimated position taking into account set and rate and leeway as well as poor steering.



Shipping lines?

Here follows a breakdown of the structure of the program:

5-40	Subroutine to check input is a number or decimal point.
900-940	Program starts at line 900 which sets up the arrays to hold the navigational information, both as strings for printing and as values for calculation.
600-660	Input $ then jumps to relevant parts of the program.
	Input "S"
4000-4040	Simply the save routine from within the program thus making it self running on loading.
	Input "A"
2000-2170	Exchanges variables V and Y and then jumps to beacon entry routine at line 102.
	Input "B"
3000-3120	The routine for listing beacons already entered.
	Input "C"
950-967	Gives choice between three possible start positions for course and distance.
125-255	Entry subroutine for lat and long with error checking.
	Input "D"
800-815	Prints current status of position, course and speed and estimated position if any.
	Input "F"
300-550	Position fixing routine. This works by finding bearing and distance between beacons whose numbers are entered left to right, and,
100-1235	using an almost exact trigonometric version of the geometrical construction used for horizontal sextant angle position fixing, finds the vessel's position.
1236-1294	Updates the current position in the arrays and, if a fix or entered position, clears the estimated position string array by GOSUB 1350.
1350-1360	The routine which clears the estimated position string array.
840-879	Works out estimated position from time elapsed and course and speed.
	This routine is also used if a course from an estimated position is asked for. The program, working out the estimated position, then asking for the destination and, finally, jumping to the course the distance finding routine at line 694, after entering the estimated position in the appropriate string at line 1236.
	Input "E"
100-110	The beacon entry and consecutive numbering routine.

Variables used

Y	Keeps count of the last beacon entered.
V	Used to hold the value of Y when altering an existing beacon.
L ()	Latitude.
G ()	Longitude.
T ()	Time.
C ()	Both course and speed.
VAR	Used to differentiate between fixes and estimated positions for data storage.
POS	Used similarly for GOTO instructions.

```
5 INPUT X$
10 FOR W=1 TO LEN X$
20 IF CODE X$(W)>37 OR CODE X$(W)<27 THEN GOTO 5
30 NEXT W
35 IF X$="" THEN GOTO 5
40 RETURN
100 CLS
101 PRINT AT 16,0;"  IF YOU HAVE FINISHED ENTERING BEACONS ENTER 100. OTHERWISE "
102 PRINT "ENTER BEACON LATITUDE DEGREES"
103 GOSUB 5
104 IF VAL X$=100 THEN GOTO 600
105 GOSUB 130
106 LET Y=Y+1
107 LET L(Y)=L
108 LET G(Y)=G
109 IF V>Y THEN LET Y=V
110 GOTO 100
125 GOSUB 5
130 LET LD=VAL X$
135 IF LD>90 OR LD<0 THEN GOTO 120
140 PRINT AT 20,0;"ENTER MINUTES"
145 GOSUB 5
150 LET LM=VAL X$
155 IF LM>=60 OR LM<0 THEN GOTO 145
160 PRINT AT 20,0;"N OR S ?        "
170 INPUT I$
175 IF I$<>"N" AND I$<>"S" THEN GOTO 170
180 PRINT AT 20,0;"ENTER LONGITUDE DEGREES     "
185 GOSUB 5
190 LET GD=VAL X$
195 IF GD>180 OR GD<0 THEN GOTO 185
200 PRINT AT 20,0;"ENTER MINUTES     "
203 GOSUB 5
205 LET GM=VAL X$
210 IF GM>=60 OR GM<0 THEN GOTO 203
215 PRINT AT 20,0;"W OR E ?        "
220 INPUT K$
225 IF K$<>"E" AND K$<>"W" THEN GOTO 220
230 PRINT AT 20,0;" LAT ";LD;" ";LM;" ";I$,"LONG ";GD;" ";GM;" ";K$
231 PRINT "IS THIS CORRECT ? ENTER Y OR N"
235 LET L=LD+LM/60
236 IF I$="S" THEN LET L=-L
240 LET G=GD+GM/60
241 IF K$="W" THEN LET G=-G
248 INPUT X$
249 IF X$<>"Y" AND X$<>"N" THEN GOTO 248
250 IF X$="N" THEN PRINT AT 20,0;"                               "
251 IF X$="N" THEN GOTO 125
255 RETURN
300 PRINT AT 16,0;"ENTER",,"NUMBER OF LEFT HAND BEACON"
305 GOSUB 5
310 LET BL=VAL X$
320 PRINT "NUMBER OF CENTRE BEACON"
325 GOSUB 5
330 LET BC=VAL X$
340 PRINT "NUMBER OF RIGHT HAND BEACON"
345 GOSUB 5
350 LET BR=VAL X$
355 IF BL>Y OR BC>Y OR BR>Y THEN GOTO 665
360 PRINT "WAIT ONE MOMENT"
365 LET DLL=60*(L(BL)-L(BC))
370 LET DEL=60*(G(BL)-G(BC))*COS (L(BC)/180*PI)
380 LET A=SQR (ABS DLL**2+ABS DEL**2)
385 LET DELA=DEL/A
386 IF DELA>1 THEN LET DELA=1
390 LET AP=ACS (DELA)*180/PI
400 IF L(BC)>L(BL) THEN LET AP=360-AP
500 LET DLR=60*(L(BR)-L(BC))
510 LET DER=60*(G(BR)-G(BC))*COS (L(BC)/180*PI)
520 LET B=SQR (ABS DLR**2+ABS DER**2)
525 LET DERB=DER/B
526 IF DERB>1 THEN LET DERB=1
530 LET BT=ACS (DERB)*180/PI
540 IF L(BC)>L(BR) THEN LET BT=360-BT
541 LET TIME=1
542 GOSUB 560
550 GOTO 1000
560 PRINT AT 20,0;"ENTER TIME IN 24 HOUR CLOCK      "
561 PRINT "                              "
565 GOSUB 5
566 IF LEN X$<4 THEN GOTO 565
570 LET T$(TIME)=X$
575 RETURN
580 PRINT AT 20,0;"ENTER SPEED IN KNOTS         "
```

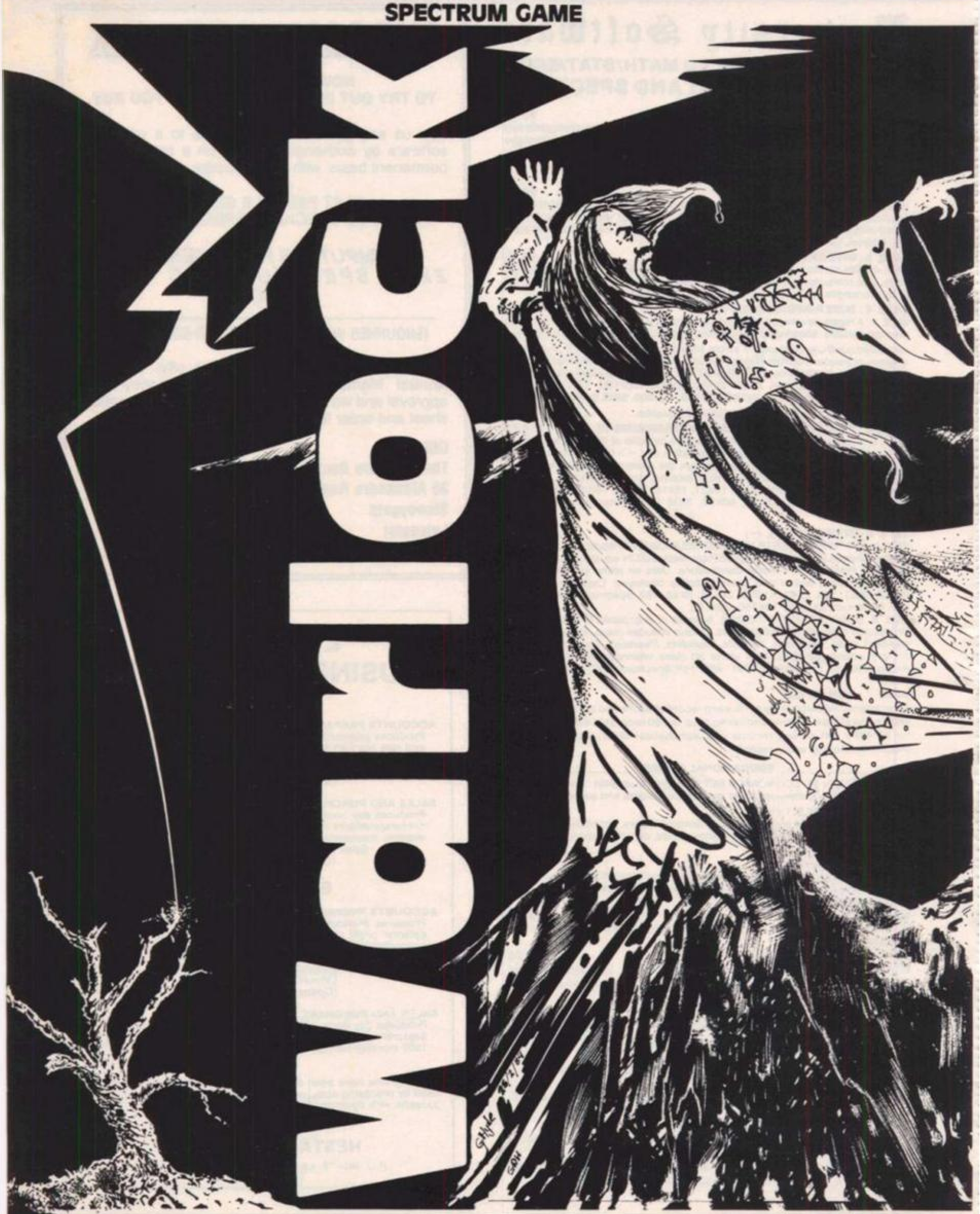
```
585 GOSUB 5
590 LET C$(2)=X$
591 CLS
595 RETURN
600 CLS
605 PRINT "ENTER",,"P TO FIND E
STIMATED POSITION     D TO DISPLA
Y CURRENT STATUS     C TO FIND C
OURSE AND DISTANCE","A TO ALTER
A BEACON","S TO SAVE TO TAPE  ",
"B TO LIST BEACONS ","E TO ENTER
 BEACONS","F TO GO TO POSITION F
IXING MODE"
610 INPUT X$
615 IF X$="C" AND PEEK 16417=2
THEN GOTO 765
620 IF X$="S" THEN GOTO 4000
625 IF X$="A" THEN GOTO 2000
630 IF X$="B" THEN GOTO 3000
635 IF X$="C" THEN GOTO 950
640 IF X$="E" THEN GOTO 100
645 IF X$="D" THEN GOTO 800
650 IF X$="F" THEN GOTO 300
655 IF X$="P" THEN GOTO 840
660 GOTO 600
665 CLS
670 PRINT "BEACONS SELECTED ARE
 NOT LISTED LIST BEACONS"
675 PAUSE 300
680 GOTO 600
690 LET DL=L(51)
691 LET GG=G(51)
692 CLS
693 LET VAR=0
694 LET POS=0
695 PRINT AT 0,0;"IS DESTINATIO
N";AT 3,0;"LAT ";L$(4);"LONG  ";
G$(4);AT 5,0;"ENTER     YES / NO"
696 INPUT X$
697 IF X$="YES" THEN GOTO 713
698 IF X$<>"NO" THEN GOTO 695
701 CLS
702 PRINT AT 16,0;" ENTER LATIT
UDE OF DESTINATION    DEGREES."
703 GOSUB 125
704 LET L$(4)=STR$ LD+" "+STR$
LM+I$
705 LET G$(4)=STR$ GD+" "+STR$
GM+K$
711 LET L(54)=L
712 LET G(54)=G
713 IF L(54)=0 THEN GOTO 701
714 LET L=L(54)
715 LET G=G(54)
716 PRINT AT 16,0;"I WILL ONLY
BE A MOMENT

                "
720 LET DLD=(L-DL)*60
725 LET DED=60*(G-GG)*COS (((L+
DL)/2)/180*PI)
730 LET DIS=SQR (ABS DLD**2+ABS
DED**2)
735 LET CO=ACS (DED/DIS)*180/PI
736 IF DL>L THEN LET CO=360-CO
737 LET CU=CO
741 LET CO=90-CO
742 IF CO<0 THEN LET CO=CO+360
743 LET C$(1)=STR$ INT (CO+.5)
744 CLS
746 PRINT "YOUR COURSE IS ";INT
(CO+.5);" DEGREES."
750 PRINT "DISTANCE ";INT DIS;"
.";INT ((DIS-INT DIS)*100);" MIL
ES"
751 IF VAR=2 THEN PRINT "FROM E
STIMATED POSITION TO     DESTIN
ATION"
752 IF VAR=2 THEN GOTO 761
755 LET Z=999
756 GOSUB 1351
760 GOTO 1300
761 LET VAR=0
762 GOTO 809
765 CLS
766 PRINT "ENTER LATITUDE OF PR
ESENT","POSITION, DEGREES.
                "
767 LET VAR=0
768 GOSUB 125
771 LET L(51)=L
772 LET G(51)=G
773 LET DL=L
775 LET GG=G
776 LET L$(1)=STR$ LD+" "+STR$
LM+I$
777 LET G$(1)=STR$ GD+" "+STR$
GM+K$
780 LET TIME=1
785 GOSUB 560
790 GOTO 692
800 CLS
801 PRINT AT 0,0;"POSITION AT "
+T$(1)+"     HOURS "
802 PRINT
803 PRINT "LATITUDE       "+L$(1)
804 PRINT
805 PRINT "LONGITUDE     "+G$(1)
806 PRINT
807 PRINT "COURSE   "+C$(1)+"SPE
ED "+C$(2)+" KNOTS"
808 PRINT
809 PRINT "ESTIMATED POSITION A
T "+T$(2)+" HOURS"
810 PRINT
811 PRINT "LATITUDE       "+L$(2)
812 PRINT
813 PRINT "LONGITUDE     "+G$(2)
814 PRINT
```

```
815 PRINT "TO RETURN TO INDEX E
NTER I
              "
816 INPUT X$
817 GOTO 600
840 CLS
841 IF CODE T$(1)=0 OR CODE C$(
1)=0 OR L(51)=0 AND L(53)=0 THEN
 PRINT "NO START POSITION OR COU
RSE      "
842 IF CODE T$(1)=0 OR CODE C$(
1)=0 OR L(51)=0 AND L(53)=0 THEN
 GOTO 605
848 LET TIME=2
849 GOSUB 560
850 LET T2=VAL T$(2,1 TO 2)+(VA
L T$(2,3 TO 4))/60
855 LET T1=VAL T$(1,1 TO 2)+(VA
L T$(1,3 TO 4))/60
860 IF T2<T1 THEN LET T2=T2+24
865 LET TM=T2-T1
866 GOSUB 580
870 LET DST=VAL C$(2)*TM
876 LET DL=L(51)+DST*(SIN (CU/1
80*PI)/60)
877 LET GG=G(51)+(((DST*COS (CU
/180*PI)/COS (DL/180*PI)))/60)
878 LET VAR=2
879 GOTO 1236
900 DIM L(60)
901 DIM G(60)
902 DIM T(4)
903 DIM C(4)
904 DIM T$(4,4)
905 DIM C$(4,6)
906 DIM L$(4,16)
907 DIM G$(4,16)
920 LET V=0
925 LET VAR=0
930 LET Y=0
935 LET POS=0
940 GOTO 600
950 CLS
951 PRINT "DO YOU WANT COURSE A
ND DISTANCE"
952 PRINT AT 1,0;"FROM PRESENT
POSITION          "
953 PRINT AT 2,0;"PLEASE ENTER
Y OR N            "
957 INPUT X$
958 IF X$="Y" THEN GOTO 765
959 PRINT AT 1,0;"FROM LAST FIX
?           "
960 INPUT X$
961 IF X$="Y" THEN LET POS=1
962 IF X$="Y" THEN GOTO 690
963 PRINT AT 1,0;"FROM ESTIMATE
D POSITION?    "
964 INPUT X$
965 IF X$="Y" THEN LET POS=2
966 IF X$="Y" THEN GOTO 840
967 GOTO 950
1000 CLS
1001 PRINT "ENTER LHS HORIZONTAL
 ANGLE DEG."
1002 GOSUB 5
1003 LET ND=VAL X$
1005 IF ND>179 OR ND<0 THEN GOTO
 1000
1006 PRINT "ENTER MINUTES"
1007 GOSUB 5
1008 LET NM=VAL X$
1009 IF NM>=60 OR NM<0 THEN GOTO
 1007
1010 PRINT ND;" DEG. ";NM;" MIN"
1011 LET N=ND+NM/60
1012 PRINT "ENTER RHS HORIZONTAL
 ANGLE DEG."
1013 GOSUB 5
1014 LET MD=VAL X$
1015 IF MD>179 OR MD<0 THEN GOTO
 1013
1016 PRINT "ENTER MINUTES"
1017 GOSUB 5
1018 LET MM=VAL X$
1019 IF MM>=60 OR MM<0 THEN GOTO
 1017
1020 PRINT MD;" DEG ";MM;" MIN"
1021 LET M=MD+MM/60
1025 PRINT "I AM WORKING IT OUT.
"
1030 LET Q=PI/180
1040 LET DP=A/(2*SIN (N*Q))
1050 LET DG=B/(2*SIN (M*Q))
1060 LET PN=DP*SIN ((AP+90-N)*Q)
1070 LET PE=DP*COS ((AP+90-N)*Q)
1080 LET GN=DG*SIN ((BT-90+M)*Q)
1090 LET GE=DG*COS ((BT-90+M)*Q)
1100 LET C=SQR (((ABS (GN-PN))**
2)+((ABS (GE-PE))**2))
1110 LET TH=ACS ((C**2+DP**2-DG*
*2)/(2*C*DP))*180/PI
1120 LET BF=AP+270-(N+2*TH)
1125 LET XF=ABS (BT-AP)
1130 IF XF>180 THEN LET XF=360-X
F
1135 IF (180-N-M)>XF THEN LET BF
=AP+2*TH-90-N
1140 IF BF<0 THEN LET BF=BF+360
1150 LET NORTH=PN+DP*SIN (BF*Q)
1160 LET EAST=PE+DP*COS (BF*Q)
1170 LET D=SQR ((ABS NORTH**2)+(
ABS EAST**2))
1180 LET BP=ACS (EAST/D)*180/PI
1190 IF SGN NORTH=-1 THEN LET BP
=360-BP
1200 LET BP=90-BP
1205 CLS
```

```
1210 IF BP<0 THEN LET BP=360+BP
1214 PRINT AT 14,0;"BCN    LHA
  BCN   RHA      BCN"
1215 PRINT BL;TAB 7;(INT (N*100)
)/100,BC;TAB 21;(INT (M*100))/10
0;TAB 30;BR
1220 PRINT "YOUR POSITION IS ",,
,"FROM BEACON NUMBER ";BC,,,"BEA
RING ";INT (BP+0.5);" DISTANCE "
;INT D;".";INT ((D-INT D)*100);"
 MILES"
1221 LET I$=" N "
1222 LET K$=" E "
1223 LET VAR=1
1225 IF SGN (L(BC)+NORTH/60)=-1
THEN LET I$=" S "
1226 IF SGN (G(BC)+EAST/60)=-1 T
HEN LET K$=" W "
1230 LET DL=L(BC)+NORTH/60
1235 LET GG=(G(BC)+((EAST/COS (L
(BC)/180*PI))/60))
1236 LET L(VAR+50)=DL
1237 LET G(VAR+50)=GG
1240 LET DF=(DL-INT DL)*60
1265 LET GL=ABS GG
1270 LET GF=(GL-INT GL)*60
1285 LET L$(VAR)=STR$ INT DL+" D
EG "+STR$ INT ((DF*100)/100)+I$
1290 LET G$(VAR)=STR$ INT GL+" D
EG "+STR$ INT ((GF*100)/100)+K$
1292 POKE 16417,0
1293 IF VAR=1 THEN GOSUB 1350
1294 IF VAR=2 AND POS=2 THEN GOT
O 694
1295 GOTO 801
1300 PRINT AT 20,0;"ENTER C TO C
ONTINUE                   "
1305 PRINT AT 21,0;"
                               "
1310 INPUT X$
1320 IF X$<>"C" THEN GOTO 1310
1325 IF X$="C" AND Z<Y THEN GOTO
 3140
1330 GOTO 800
1350 LET C$(1)=""
1351 LET C$(2)=""
1353 LET T$(2)=""
1354 LET L$(2)=""
1355 LET G$(2)=""
1360 RETURN
2000 CLS
2010 IF Y<1 THEN GOTO 3000
2100 PRINT "ENTER NUMBER OF BEAC
ON YOU WISH  TO CHANGE"
2110 GOSUB 5
2120 LET V=VAL X$
2130 IF V>Y THEN PRINT "NO SUCH
BEACON TRY AGAIN"
2140 IF V>Y THEN GOTO 2110
2150 LET V=Y
2160 LET Y=VAL X$-1
2170 GOTO 102
3000 CLS
3005 IF Y=0 THEN PRINT "THERE AR
ENT NO BEACONS"
3020 IF Y=0 THEN GOTO 605
3025 PRINT AT 0,0;"BEACON LATITU
DE     LONGITUDE"
3030 FOR Z=1 TO Y
3040 LET V$="N   "
3050 LET H$="E   "
3060 IF SGN L(Z)=-1 THEN LET V$=
"S   "
3070 IF SGN G(Z)=-1 THEN LET H$=
"W   "
3080 LET L=ABS L(Z)
3090 LET G=ABS G(Z)
3120 PRINT Z;"        ";INT L;" DE
G ";INT ((L-INT L)*60+.5);V$;INT
 G;" DEG ";INT ((G-INT G)*60+.5)
;H$
3130 IF PEEK 16442<5 THEN GOSUB
3150
3140 NEXT Z
3145 GOTO 1300
3150 PRINT "ENTER C TO CONTINUE"
3155 INPUT X$
3156 CLS
3160 PRINT AT 0,0;"BEACON LATITU
DE     LONGITUDE"
3165 RETURN
4000 CLS
4005 PRINT "SET TAPE RECORDER TO
 RECORD AND PRESS NEWLINE"
4010 INPUT S$
4015 SAVE "NAV FIX"
4020 POKE 16417,2
4025 CLS
4030 IF PEEK 16404+256*PEEK 1640
5-16509>11000 THEN GOTO 600
4035 CLEAR
4040 GOTO 900
9999 PRINT PEEK 16404+256*PEEK 1
6405-16509
```




Warlock



Danger, magic, monsters and gold await you in Hugh Walker's super Spectrum game.

In the Aug/Sept issue of *ZX Computing* we printed a program called House of Horror for the ZX81 by Chris Cox. Hugh Walker has modified it for the Spectrum and added many new items which turn it into a totally different program!

One of the problems with adventure games is that you can often complete the game from the knowledge gained by entering it. Hugh has adopted two methods to prevent this from spoiling your pleasure. Firstly he has not REMmed the listing and has laid it out in an illogical way, and secondly he has used random elements to provide surprises without losing too much player skill.

You are a 'novice-hero' whose task is to raid the Warlock's mansion and find all his gold, using the keys which you find to unlock any doors and fighting off his pet monsters with your sword and shield. Each key may be used once only, but not all the doors are locked.

The questionable ethics of a young hero turning thief are satisfied by the fact that the Warlock's treasure has been extorted from the oppressed peasants in his locality. Should you be successful, you will, no doubt, restore the gold to its rightful owners. The hero-rating which you acquire directly reflects the amount of gold you have found, and no one, except the Warlock, can take this from you. (Indeed, it is possible that, in some future program, you will return as a wiser, stronger hero to deal with the Warlock permanently!)

To find the treasure and the keys you must open doors, explore hallways and defeat monsters whenever the opportunity arises. However, you may not find anything and be given an opportunity to rest and build up your strength. This strength is limited and it is reduced by fighting, so the opportunity to rest is useful. The Warlock is away at the start of the game, but he may return and catch you. If he does he will either fight you, proving difficult to chase away, or he will use his magic to turn you into a small creature, robbing you of your hero status (hero-rating).

When you have collected all the treasure you will be congratulated and told to find your way out "...if you can!" The way out is through a door on level 0 so you are also told which level you are on. You then have to make your way to level 0, open the door (which may be locked) and leave, triumphantly.

Whenever you are confronted by a monster or the Warlock himself in a fighting mood, you will be given the option to "hit it (him)" or to "run away". You cannot kill the monsters (you are only a young hero) but you can chase them away. However, some are difficult to defeat and each blow you deliver uses up some of your strength. If you use up all your strength, then you have lost! Nevertheless, if you choose to run away you will be called a COWARD and lose some of your HQ (hero-quotient), and you MAY lose some treasure...or, you MAY be trapped by the monster. Your HQ is a factor in calculating your 'Hero-rating'...so your honour is at stake! If your attempt to hit the monster, or Warlock, fails to chase it away or your attempt to run away has been unsuccessful, you will be given the option to 'hit it' or 'run away' again.

As you move around the mansion you will find one of three locations: 'Door', 'Hallway' and 'Stairway'.

Oh! By the way, only the computer knows what the total amount of treasure to be found is and it won't tell you until you have reached that amount (it will be between 1500 and 2500 coins). Good luck!

---

1. Door :(may be locked) :you have two options : 'Open' or 'Leave'.
   If you open the door, you may find a reward...or a monster...or nothing, and have to leave. If the door is locked and you have no key, then you have to leave...each time you leave a location, whether by choice or not, you risk meeting a monster, which may result in loss of treasure.
2. Hallway : three options : 'Move', 'Explore', or 'Status'.
   Move: moving backwards or sideways may result in a bump on the head from a low beam, causing some loss of strength; moving forwards is safe because you would see the low beam in front of you!
   Explore: you may find treasure, a key, a rest, a monster or another location or nothing and have to leave...with the same risk as above.
   Status: Lists your possessions, what level you are on and returns you to the options 'Move, Explore or Status' when you are ready.
3 Stairway :three options : 'Up', 'Down' or 'Leave'.
   You will not know if the stairway goes up or down until you try. If you make the wrong choice you will have to leave.



Variables

1. The following are DIMensioned arrays, READ from DATA.

m$(9,9) : The name of each monster (and Warlock).
a$(3,9) : The three locations found (door, hallway, stairway).
k$(3,6) : The three small creatures into which the Warlock may turn you.
m(9) : The resistance of each monster to your blows.
n(9) : The endurance of each monster to withstand successful blows.
g(9) : The value by which your Hero-quotient is increased when you beat each monster and the length of each monster's name (for tabulation in lines 3090 and 3110).
z(11) : The length of the BEEPs in line 4000.
y(11) : The pitch of the BEEPs in line 4000.

2 The following are 'single' variables.

hi : High Score, carried forward to successive games ('hi' = 'hr')
*hr : Hero-rating, ie overall score in each game.
hq : Hero-quotient, increased by defeating monsters (by a randomly-adjusted value of 'g').
ded : The number of monsters beaten.
ht : The force of your blow when you hit a monster (randomly selected).
blo : The value by which a successful blow reduces the monster's endurance.
mn : Random value (1 to 9) to select monster from m$ (array), and associated values of 'm', 'n', and 'g'.
str : Your strength, initially 500: reduced by fighting or bumping your head: increased by resting.
wl : The value by which 'str' is reduced when you bump your head (randomly selected).
tres : The maximum amount of treasure to find (between 1500 and 2500; randomly selected).
tr : A logic variable to change course of program when 'tres' has been reached. It prevents more treasure being found and allows you to leave from line 1630 if you are on level 0.
csh : The amount of treasure you possess.
cn : The amount of treasure found each time.
ky : The number of keys in your possession.
wy : Random value (1 to 3) to select a$ and direct GO SUB in line 140.
fl : The level (floor) which you are on.
bp : Used in lines 400 to 460; 'bp' = +1 'Up' and bp= −1 for 'Down': it alters 'fl' and the pitch of the BEEP routine (line 460).

(*Your hero-rating is calculatye by adding 'csh' + ('ky' *5) + 'hq' and is uprated each time you change your location).
In the course of the program 'f', 'i' and 'h' are used as FOR-NEXT variables for various purposes.

Please note: 1 Unlablled Random-values are used to direct some of the 'GO TOs'.
2 INKEY$ is used for your responses to the various options offered you. This allows single-key entries to speed up operation of the game. However, PAUSEs and BEEPs have to be used to slow down the display.

Program description

Line 20 : Initialise High Score for successive games.
Lines 50 to 60 : Initialise each game (routine completed by calling subroutine 5000 to 5500)
Lines 100 to 150 : 'Core-routine' to which all other routines return.
Selects and PRINTs locations and directs GO SUB for each.

Location: (lines 200 to 460)
Lines 200 to 220 : 'Hallway' PRINTs and acts on options, using 'GO TO' : 500, 600, or 700.
Lines 300 to 330 : 'Door' PRINTS and acts on options using 'GOTO': 800 or 8200.
Lines 400 to 460 : 'Stairway' PRINTs and acts on options, routine complete.

Response to 'Hallway' routine (lines 500 to 780)
Lines 500 to 520 : Move selected by INKEYs "1" in line 220; PRINT's etc options (complete).

Line 600 : 'Explore' selected by INKEYs "2" in line 220; uses 'GO TO' line 1650.

Lines 700 to 780 : 'Status' selected by INKEYs "3" in line 220, PRINTs possession, score, what level you are on and returns to line 200 when you are ready.

Response to 'Door' routine

Line 800 : 'Open' selected by INKEYs "1" in line 320.
Random chance of: (GO TO 1500 door locked) or (GO TO 1600 door open).

Responses to 'Explore' and 'Door opens' (lines 1000 to 1460)

Lines 1000 to 1800 (from 1650) (or 8200) : 'Meet Monster' routine; Selects monster, PRINTS and acts on options to fight (GO TO line 3000) or run away (GO TO line 8500) or random chance of monster stealing gold instead of fighting and if Warlock is met, random chance of Warlock using magic (GO TO line 1700).

Lines 1100 to 1150 : 'Find gold' routine, from line 1650 (also from line 3130).
If maximum amount has not been found, calculates amount of each find (amount reduces in proportion to total already found), PRINTs amount found and increments gold score, then checks gold score against maximum.

Lines 1200 to 1220 : 'Find key' routine from line 1650 (also from line 3130).
Random chance of finding a key, or another location. If a key is found, PRINTs and increments one key to key score.

Line 1300 (from 1650) : 'Find nothing' routine; uses lines 8000 to 8210 to complete routine.

Lines 1400 to 1460 (from 1650) : 'Find rest' routine; random chance of finding rest or another location. If rest, then PRINTs, BEEPs and increments strength score.

Continuation of 'Door' routine: (lineds 1500 to 1650) from line 800

Lines 1500 to 1550 : 'Door locked' routine; checks if you have a key (if not then GO TO 6500). If you have a key, then asks if you want to use it? (if "No" GO TO 6500). If "Yes" then decrements one from key-score and carries on to line 1600.

Lines 1600 to 1650 : 'Door opens' routine; (from line 1550 or line 800).
PRINTs, uses 4100 for BEEPs, checks if you have finished and randomly selects 'GO TO' : lines 1000, or 1100 or 1200 or 1300 or 1400.

END routines : (Lines 1700 to 2050)

Lines 1700 to 1770 : 'Bitter End' routine; (Warlock 'uses magic') from line 1030.
PRINTs, selecting k$ from array, uses line 1900 to 1950 to complete.

Lines 1800 to 1880 : 'Successful End' routine; from line 1630.
PRINTs scores and uses 1900 to 1950 to complete.

Lines 1900 to 1950 : 'Hi score' and 'Play again' routines; from lines 1770, 1880 or 2050.
Increments High Score and asks if you want to try again. If "Yes" then goes to line 50; if "No" then STOPs.

Lines 2000 to 2050 : 'Out of Strength' routine; from line 3010.
PRINTs and uses lines 1850 to 1950 to complete.

Lines 2500 to 2570 : 'All treasure found' routine; from line 1140.
PRINTs, sets logic variable tr to 1, returns to 'core-routine' (L 100).

Fight Routine (lines 3000 to 3130), from line 1080.'

Lines 3000 to 3040 : Calculates the force of your blow, decrements strength, checks to see if you injured the monster, if you did, then 'GO TO' line 3050,
if you did not, then goes to line 1050 for another try.

Lines 3050 to 3130 : Calculates how badly you hurt the monster, decrements monster's endurance; if monster is still fit to right, then returns to line 1050,
if monster is not fit to continue then PRINTs, increments 'hero-quotient', uses 'GO TO': 1100 or 1200 for reward.

Line 3500 : 'Title' subroutine: PRINTs title, used by various parts of program to which it returns.

Lines 4000 to 4500 : BEEP routines (subroutines). Returns to 'core-routine' if 'GO TO 4000' etc is used.

Lines 5000 to 5190 : 'Initialise routine' subroutine called by line 60.
DIMs arrays, READs arrays from DATA (lines 7500 to 7800), PRINTs instructions and intialises variables, uses line 5500 to continue.

Line 5500 : 'CONTINUE' routine; from various parts of program, returns to 'Core-routine' (1200)

Lines 6000 to 6050 : 'Monster steals gold' routine; from line 1040.
PRINTs, decrements gold-score, PRINTs new gold-score, checks if new gold score is below maximum and resets tr if necessary.

Line 6500 : "No!" routine from lines 1510, 1540; uses GO TO 8000 to continue.

Line 8000 : 'Leave routine' from lines: 320, 430, 1300, 1460 and 6500 — carries on to L 8200.

Lines 8200 to 8210 : Random chance of meeting another monster. From lines 330, 420 and 8000.

Lines 8500 to 8530 : 'Run away' routine; from lines 1070.
PRINTs "Coward" and decrements 'hero-quotient' then random chance of:

Line 8520 : (a) Dropping gold uses GO TO 6010 to decrement gold-score and return to 'core-routine'.

Line 8540 : (b) being trapped; returns to line 1050 for another try.

Lines 9000 to 9050 : 'SAVE' routine; accessed by 'BREAK', 'GO TO 9000'.

Further developments

1. A lateral dimension could be added to this program so that the 'Move' routine translates sideways, forwards or backwards; within a 2-dimensional array from a fixed entry point to a fixed exit point, maintaining the vertical dimension ('fl') requirements to qualify for successful exit at line 1630. This exit point could be randomly generated in each game and added to the exit requirements at line 1630.
2. A random value could be generated (say between 0 and 10) as the vertical dimension which 'fl' would have to equal to qualify for successful exit at line 1630.



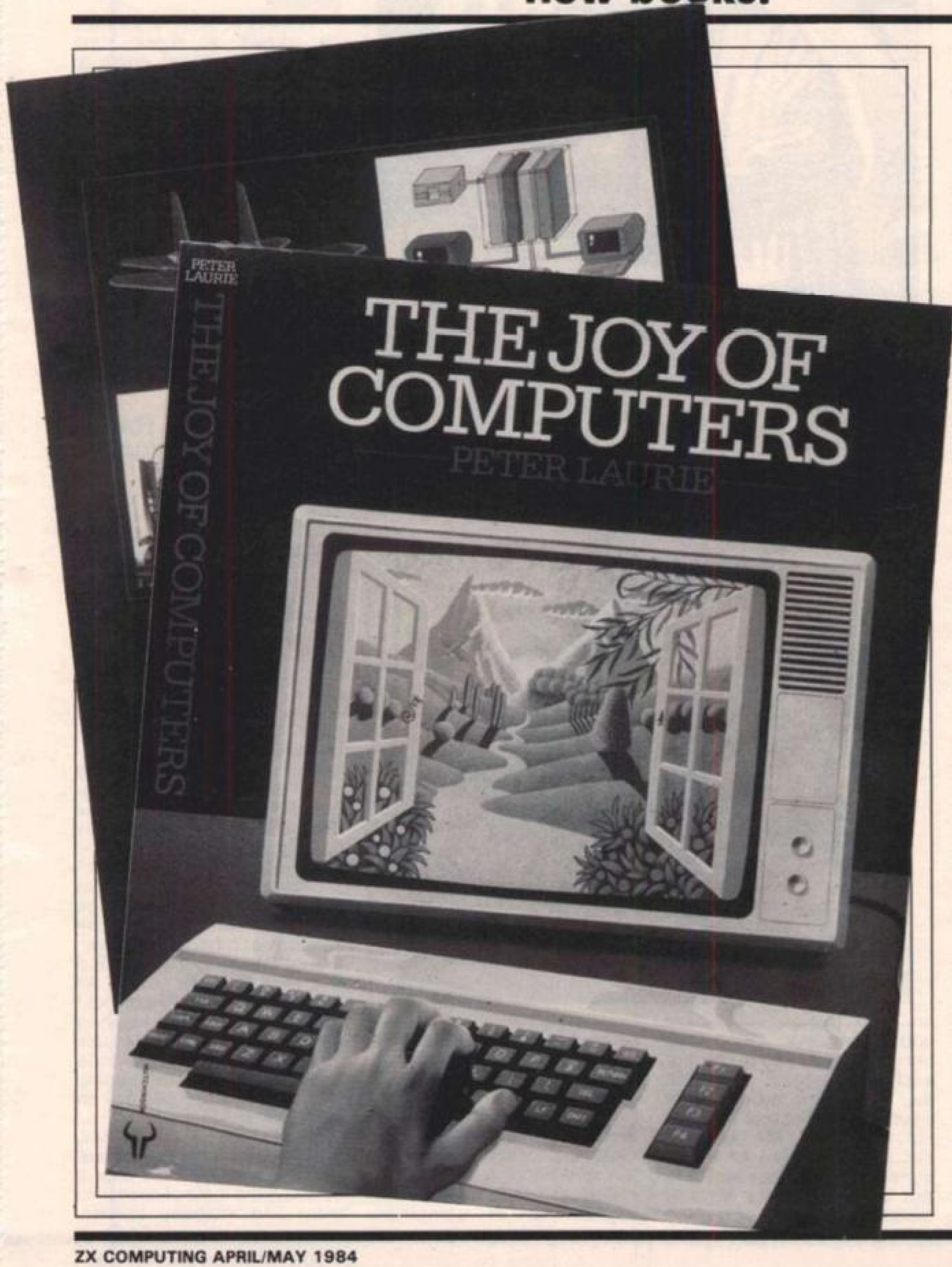
```
  10 REM WARLOCK
  20 LET hi=0
  50 PAPER 0: INK 9: BORDER 0: C
LS
  60 GO SUB 5000
 100 LET wy= INT ( RND *3)+1
 110 CLS : PRINT " You find a ";
a$(wy)
 120 LET hr=csh+ky*5+hq
 140 GO SUB 100+100*wy
 150 GO TO 100
 200 PRINT '"(1) Move;(2) Explor
e;(3) Status "
 210 PAUSE 0: IF  INKEY$ <"1" OR
  INKEY$ >"3" THEN  GO TO 210
 220 GO TO 400+100* VAL  INKEY$
 300 PRINT '"(1) Open; (2) Leave
 "
 310 PAUSE 0: IF  INKEY$ <"1" OR
  INKEY$ >"2" THEN  GO TO 310
 320 IF  INKEY$ ="1" THEN  GO TO
 800
 330 GO TO 8200
 400 PRINT '"(1) Up;  (2) Down;
 (3) Leave"
 410 PAUSE 0: IF  INKEY$ <"1" OR
  INKEY$ >"3" THEN  GO TO 410
 420 IF  INKEY$ ="3" THEN  GO TO
 8200
 430 IF  INT ( RND *3) THEN  PRI
NT '" No way ";("up!" AND  INKEY
$ ="1");("down!" AND  INKEY$ ="2
");: GO TO 8000
 440 LET bp=( INKEY$ ="1")-( INK
EY$ ="2")
 450 LET fl=fl+bp: PRINT '" O.K.
 You are now on level ";fl
 460 FOR f=2 TO 30 STEP 2: BORDE
R  INT (f/4): BEEP .05,f*bp: NEX
T f: BORDER 0: RETURN
 500 PRINT '"1:Forward 2:Back 3:
Left 4:Right"
 510 PAUSE 0: IF  INKEY$ >"1" AN
D  INT ( RND *2) THEN  PRINT '"
You run into a low beam"''" and
hurt your head";: GO SUB 4500: L
ET wl= INT ( RND *5)+1: LET str=
str-wl*10: PRINT ".....Ouch!"
 520 PAUSE 50: RETURN
 600 GO TO 1650
 700 CLS : PRINT  TAB 12;"STATUS
"
 710 PRINT '"You have:"
 720 PRINT ' TAB 7;"A sword and
shield"
 730 PRINT ' TAB 7;"Strength....
.....";str
 740 PRINT ' TAB 7;"Gold coins..
.....";csh
 750 PRINT ' TAB 7;"Keys........
.....";ky
 760 PRINT ' TAB 7;"Monsters Bea
ten..";ded
 770 PRINT ' TAB 7;"Hero rating.
.....";hr
 780 PRINT '' TAB 7;"You are on
level ";fl : GO SUB 5500: GO TO
200
 800 GO TO 1500+100* INT ( RND *
2)
1000 LET mn= INT ( RND *9)+1
1010 CLS : PRINT '" SUDDENLY!"''
" You meet the ";m$(mn)
1020 FOR f=2 TO 21: BEEP .04,10:
 BORDER  INT ( RND *7): BEEP .05
,-10: NEXT f: BORDER 0
1030 IF  NOT  INT ( RND *5) AND
mn=9 THEN  GO TO 1700
1040 IF  NOT  INT ( RND *10) THE
N  GO TO 6000
1050 INPUT "": PRINT '" What do
you do?"''"(1) Hit ";("it" AND m
n<9);("him" AND mn=9);"!  (2) Ru
r away!"
1060 PAUSE 0: IF  INKEY$ <"1" OR
  INKEY$ >"2" THEN  GO TO 1060
1070 IF  INKEY$ ="2" THEN  GO TO
 8500
1080 IF  INKEY$ ="1" THEN  GO TO
 3000
1100 IF tr THEN  PAUSE 50: RETUR
N
1110 LET cn= INT ( RND *(500/( I
NT (csh/500)+1)))+50
1120 PRINT ' INK 6;" You find ";
cn;" gold coins."
1130 LET csh=csh+cn
1140 IF csh >= tres THEN  GO TO
2500
1150 GO TO 4100
1200 IF  INT ( RND *2) THEN  PAU
SE 50: RETURN
1210 PRINT '" You find a key."
1220 LET ky=ky+1: GO TO 4100
1300 PRINT '" Nothing there";: G
O TO 8000
1400 IF  INT ( RND *2) THEN  RET
URN
1410 PRINT '" You find some some
"''" food and wine."''" Have a r
est."
1420 LET str=str+ INT ( RND *50)
```

```
+5: IF str>500 THEN  LET str=500
1430 PRINT '" ZZZZZ ZZZZZ ZZZZZ
ZZZZZ ZZZZZ"
1440 FOR f=1 TO 5: BEEP 1.5,-48:
 BEEP 0.2,-47: PAUSE 25: NEXT f
1450 PRINT ''" Oh dear! Time to
go.";
1460 GO TO 8000
1500 PRINT '" Door locked!";: GO
 SUB 4500: PRINT "....Have you a
 key?"
1510 PAUSE 50: IF ky<1 THEN  GO
TO 6500
1520 PRINT '" Yes.";: PAUSE 20:
PRINT "do you want to use it?(Y/
N)"
1530 PAUSE 0: IF  INKEY$  <> "y"
 AND  INKEY$  <> "Y" AND  INKEY$
  <> "n" AND  INKEY$ <> "N" THE
N  GO TO 1530
1540 IF  INKEY$ ="n" OR  INKEY$
="N" THEN  GO TO 6500
1550 PRINT '" Yes......Unlock do
or.";: LET ky=ky-1: PAUSE 20: PR
INT "...click"
1600 PRINT '" The door opens.";
1610 GO SUB 4100
1620 PRINT "..........look!"
1630 IF  NOT f1 AND tr THEN  GO
TO 1800
1640 PAUSE 50
1650 GO TO 1000+100* INT ( RND *
5)
1700 CLS : GO SUB 3500
1710 PRINT ' TAB 9;"THE BITTER E
ND"' TAB 9;"*************"
1720 PRINT ''"     You met your E
nd at the"
1730 PRINT '"     hands of the WA
RLOCK."''"     He turned you into
 a ";k$( INT ( RND *3)+1)
1740 PRINT '"     Your Hero-ratin
g WAS ";hr
1750 PRINT ' INK 6;"     You foun
d ";csh;" gold coins."
1760 GO SUB 4000: PRINT  AT 19,1
0;"NOW HOP IT!": PAUSE 20: PRINT
  AT 19,14;"   "; AT 18,14;"HOP"
: PAUSE 10: PRINT  AT 18,14;"
"; AT 19,14;"HOP"
1770 GO TO 1900
1800 GO SUB 3500
1810 PRINT ' TAB 8;"Congratulati
ons!"
1820 PRINT '"     You've cheated t
he Warlock"
1830 PRINT ' TAB 8;"and his pets
!"
1840 FOR i=1 TO 3: GO SUB 4100:
NEXT i
1850 PRINT ' INK 6;"   You found
 ";csh;" gold coins."
1860 PRINT '"   You have ";ky;"
key";("s" AND ky <> 1);" left."
1870 PRINT '"   You defeated ";d
ed;" Monsters."
1880 PRINT '"   Your hero-rating
 ";("i" AND str>0);("wa" AND str
 <= 0);"s ";hr
1900 IF hr>hi THEN  LET hi=hr
1910 PRINT  AT 21,7;"Highest Sco
re:";hi
1920 INPUT "": PRINT #0; TAB 7;"
Another go ? (Y/N) ": PAUSE 0
1930 IF  INKEY$ ="Y" OR  INKEY$
="y" THEN  CLS : GO TO 50
1940 IF  INKEY$ ="n" OR  INKEY$
="N" THEN  STOP
1950 GO TO 1920
2000 GO SUB 3500
2010 PRINT '" You've run out o
f strength."
2020 PRINT '"   The Warlock has
won again!"
2030 GO SUB 4000
2040 PRINT ' TAB 8;"Before you d
ied"
2050 GO TO 1850
2500 GO SUB 4100: CLS : PRINT  A
T 1,10;"WELL DONE!"
2510 PRINT '' TAB 3;"You have fo
und all of "
2520 PRINT ' TAB 3;"the Warlock'
s treasure!"
2525 PRINT ' TAB 3;"Now get out"
;: PAUSE 20: PRINT "..if you can
!"
2530 PRINT '' TAB 3;"You are on
level ";f1
2540 PRINT ' TAB 3;"The way out
is through "
2550 PRINT ' TAB 3;"a door on le
vel 0"
2560 PAUSE 30: PRINT ''' TAB 10;
"Good luck!"
2570 LET tr=1: GO TO 5500
3000 LET ht= INT ( RND *10)+1
3010 LET str=str-ht*( INT ( RND
*2)+1): IF str<1 THEN  GO TO 200
0
3020 IF ht>m(mn) THEN  GO TO 305
0
3030 PRINT '" You didn't hurt th
e ";m$(mn)
3040 GO SUB 4500: GO TO 1050
3050 LET blo=ht-m(mn)
3060 PRINT '(" You hurt the " AN
D blo >= 3);(" You frightened th
```

```
e " AND blo <= 2);m$(mn): GO SUB
 4100
3070 LET n(mn)=n(mn)-blo
3080 IF n(mn)<1 THEN GO TO 3110
3090 IF n(mn)<3 THEN PRINT '" T
he ";m$(mn)( TO g(mn));" looks v
ery ill."
3100 GO TO 1050
3110 PAUSE 50: PRINT '" The ";m$
(mn)( TO g(mn));" runs away": GO
 SUB 4100: PRINT '" BUT your str
ength is now ";str
3120 LET hq=hq+g(mn)*( INT ( RND
 *3)+1): LET ded=ded+1
3130 GO TO 1100+100* INT ( RND *
2)
3500 CLS : PRINT AT 1,12;"WARLO
CK"' TAB 12;"*******": RETURN
4000 FOR f=1 TO 11: BEEP z(f),y(
f): NEXT f: RETURN
4100 FOR f=10 TO 20: FOR h=0 TO
3: BORDER h: BEEP .016,f*2-h: NE
XT h: NEXT f: BORDER 0: RETURN
4500 FOR f=5 TO 6: BEEP .5,-6*f:
 NEXT f: PAUSE 50: RETURN
5000 GO SUB 3500
5010 PRINT AT 15,6;"Instruction
s follow"
5020 GO SUB 5500: GO SUB 3500
5030 DIM m$(9,9): DIM a$(3,9)
5040 DIM m(9): DIM n(9): DIM g(9
)
5050 DIM k$(3,6): DIM z(11): DIM
 y(11)
5060 RESTORE : FOR f=1 TO 9: REA
D m$(f): READ m(f): READ n(f): R
EAD g(f): NEXT f
5070 FOR f=1 TO 3: READ a$(f): N
EXT f
5080 FOR f=1 TO 11: READ z(f): R
EAD y(f): NEXT f
5090 FOR f=1 TO 3: READ k$(f): N
EXT f
5100 PRINT '" You are a novice h
ero raiding"'' TAB 5;"the Warloc
k's Mansion."
5110 PRINT '" You hope to find h
is "; FLASH 1; PAPER 6;"TREASURE
."
5120 PRINT '" ......The Warlock
is away....."'' TAB 13; FLASH 1;
"BUT"; FLASH 0
5130 PRINT '" He has left his pe
ts guard it!"
5140 PRINT ''"BEWARE THE RETURN
OF THE WARLOCK"
5150 FOR f=1 TO 3: FOR i=4 TO 7:
 FOR h=2 TO 6: BEEP .01,f+i+h: B
ORDER h: BEEP .01,i+h-f: BORDER
i: BEEP .01,h+f-i: BORDER f: NEX
T h: NEXT i: NEXT f: BORDER 0
5160 LET hr=0: LET tr=0: LET ky=
0
5170 LET tres=1500+100* INT ( RN
D *10)
5180 LET f1=0: LET ded=0: LET hq
=0
5190 LET str=500: LET csh=0
5500 PRINT AT 21,3;"Press any k
ey to CONTINUE": PAUSE 0: CLS :
RETURN
6000 PRINT '" Who knocks you ove
r and"''" takes some of your gol
d."
6010 LET csh=csh- INT (csh/( INT
 ( RND *3)+1))
6020 PRINT ''; INK 6;" You now h
ave ";csh;" gold coins."
6030 IF tr AND csh<tres THEN LE
T tr=0: PRINT ''' TAB 3;"Start l
ooking again."
6050 GO TO 4500
6500 PRINT '" No!";: GO TO 8000
7500 DATA "Goblin",5,8,6,"Troll"
,3,10,5,"Demon",2,10,5,"Vampire"
,2,8,7,"Werewolf",4,9,8,"Python"
,3,4,6,"Ghost",2,8,5,"Dragon",4,
8,6,"WARLOCK",8,12,7
7600 DATA "Hallway.","Door.","St
airway."
7700 DATA 1,4,1,4,0.3,4,1.2,4,0.
75,7,0.5,6,1,6,0.3,4,0.7,4,0.5,3
,1,4
7800 DATA "rabbit","frog","flea"
8000 PRINT ".....Leave!": GO SUB
 4500
8200 IF NOT INT ( RND *5) THEN
 GO TO 1000
8210 RETURN
8500 PRINT '" Coward": LET hq=hq
-g(mn)*( INT ( RND *3)+1): IF hq
<1 THEN LET hq=0
8510 GO TO 8520+10* INT ( RND *3
)
8520 PRINT '" Unfortunately, in
your haste"''" you trip and drop
 some gold.": GO TO 6010
8530 GO TO 4500
8540 PRINT '" Oh! Bad luck! He t
raps you.": GO SUB 4500: GO TO 1
050
9000 CLEAR : LET S$="WARLOCK"
9010 SAVE S$ LINE 0: BEEP 1,10
9020 PRINT "REWIND & PRESS ANY K
EY TO VERIFY "
9030 PAUSE 0
9040 VERIFY S$: BEEP 1,0
9050 STOP
```

Bookshelf

Patrick Cain once more puts on his thinking cap, stokes the log fire and settles down with three new books.



The Joy of Computers — Peter Laurie

Don't push off to fetch your Kleenex please, but I must admit that the life of a reviewer can be a dull and arduous one. Long before these witty, well-penned testimonials ever reach the page there are periods of intense self denial and solitude to be gone through, sifting and sorting wearily through page after page of 'INKEY$' memory addresses and almost illegible program listings. Of course it really is all fun and I love it; but sometimes I love it more than others and reading 'The Joy of Computers' was one of those times. Published by Hutchinson and written by Peter Laurie, an editor of Practical Computing, the 200 pages, many of them with superb colour illustrations, are themselves a joy to read.

A VDU screen on the cover shows a picture of a window opening to a country scene with green fields and trees and a golden sun setting between two mountains (maybe the book should have been called 'The Joy of Landscapes'). Opening the cover and turning to the introduction on page seven gives a clue to the strange cover subject. Peter Laurie speaking of the limitation of his book says "I can only open windows into a multitude of fascinating gardens: I hope my readers will think it worth while to go out into them!" His treatment of those gardens on the pages inside the book is as effective as the garden picture on the glossy hardbound cover is pretty.

The publishers have aimed 'The Joy of Computing' at anyone who has just bought or is about to buy their first computer. It is my belief that

its appeal will be broader than this. The text is not pertinent to any particular computer; rather, it introduces, in non-technical language how computers work, how they can and are being used and attempts to explore the future that they are already making reality. Throughout the text is enlarged by brilliant colour illustrations.

Subdivided into four sections; the readers can read from start to finish or flit from section to section as takes his fancy. No previous knowledge of computers is required.

Section 1: 'The Computer' looks at the micro, delving below the keyboard to identify the working bits — memory and processor, transistors, chips, gates and busses: offering easy to understand descriptions of the detail. It then moves to those parts above the keyboard screens, printers and plotters and magnetic memory and gives an equally effective description of their workings and uses. The picture of the micro is completed by a discussion on software, home software games, files and operating systems. I found the text steering a difficult path well; that of being comprehensible to non-computer people and yet interesting to those of us who like to think we know a bit about such things. I'm not too shy to say that the theory and the many examples of applications filled in a large piece of background for me.

Charged with this new knowledge I hesitantly turned to Section 2, 'Programming'. The idea that I might discover inadequacies in my programming knowledge was not a comforting one. Part 2 deals with programming from a basic discussion through to fractals — the study of irregular shaped objects, covering on the way, 'BASIC', 'Structured Programming', 'Machine Code', 'Zipf's Law' and some other things I had never heard of. I felt quite uncomfortable. Again the discussion was informative and yet not technical; I felt I had been introduced to some new ideas and new programmers should find plenty of useful direction.

The world of 'Professional Computing' is put under the microscope in Section Three. Even amongst those who work in commercial computing there are a few with such a





wide overview. Of course computer technology is put to such widespread uses that any detailed study would be beyond the scope of any one volume; but Mr Laurie's success has been to select suitable applications that help put the state of the art into perspective. The background painted is broad and bulging with interesting information. 'Business Software', 'Database Managers', 'Image Processing', Talking Computers', 'Robots', 'Androids' and 'The Electronic Office' are only a few of the topics looked at.

The structure, uses and applications of computers today and a look at the implications of computer technology in the future are all covered in the final section called 'Progress'. This section examines the 'Revolution in Thinking' that is taking place, 'Current Trends', 'Hardware Advances' and asks 'What Next?' and 'Where will It End?'. On the last two questions Peter Laurie has been wise enough to outline the likely shape, but not attempt to colour these particular gardens.

'The Joy of Computers' may be aimed at those who already have or are about to buy a home computer but to my mind it is a book for anyone who has an interest in todays world. Peter Laurie has opened the windows onto a number of computer gardens so successfully that most readers are likely to be encouraged to do further digging themselves.

'The Joy of Computers' by Peter Laurie is published by Hutchinsons and is a gift worth treating yourself to at £9.99. ISBN 0 09 153 0105

20 Programs for the ZX Spectrum and 16K ZX81 — S Daly

I have often in the past raved on these pages about the quality of books published by Babini Publishing. The books are economical and although small are filled with advice and instruction of good quality that is logically laid out and written with the reader in mind. '20 Programs for the ZX Spectrum and 16K ZX 81' certainly does not suggest a novel approach to computer books: how then does this Babini Publication, written by S. Daly, stand up against the many similar titles available?

Often such books aimed at more than one machine appear to consider only one and look at others as an afterthought. I was grateful to find that here this was not so. All the programs contained could be readily loaded onto other systems, precluding the use of PEEK/POKE, machine code routines and various graphic symbols that are peculiar to particular machines.

As the author points out, most of the programs are accompanied by flow charts detailing the logic of each program and enabling conver-

sion to coding forms for other machines. Flow charts too are helpful to less experienced programmers giving guidance on program development and structure while more experienced users can clearly follow the logic in order and can modify or improve the program as desired — rather like clearing away the trees to expose the wood. Each program is further supported by a short but precise descriptive text. Many other books lay greater emphasis on these texts, including in them an almost line by line description of the program offering detail of all but the kitchen sink. This is not Mr. Daly's style. I found the texts to be at times a little too brief and often wished for further description of the listings; but for the most part they were adequate.

Of the programs: it may well be that the author didn't have to say too much about them anyway. Not because the flow charts were sufficient but because in most cases the program didn't require them. There were six sections of programs; two games sections e.g. 'Bragg', 'Pontoon', 'Solitaire', 'Battleships'; a section on filing systems; some mathematical programs and a section of statistics. There was also a chapter on sorting containing one 'Alpha Sort' program. Unfortunately, like the title, few of the programs were novel. 'Binary to Decimal' or 'Decimal to Binary' programs are ten a penny but to be fair, the examples inclued here were of a high quality and represent a good allocation of basic programs for the new user.

Throughout this book the author has taken pains to ensure that the programs are bug free and as is typical of Babini books all listings were dumped from print to ensure their accuracy. Experienced users are unlikely to find too much of real benefit in this well compiled little volume but to the host of new users who should have recently joined us, the twenty programs included should prove to be worthwhile and act as useful guides to developing and improving their own programming ability.

'20 Programs for the ZX Spectrum and the 16K ZX81' is written by S. Daly, published by Babini publishing and at £1.95 for over 110 pages, represents good value.
ISBN 0-85934-103-8



Self-Instruct BASIC A practical guide — Antony & James Clark

It's said that first impressions go a long way: my first impression of this book certainly didn't take it any further than the floor. As I opened the cover I thought 'Self Destruct Basic' might have been more appropriate! For some reason the publishers, Pitman, have bound this volume in a fashion similar to a secretary's shorthand pad. Opening it for a second time, with a bit more care, I began to form second impressions of the novel binding and the contents.

Once mastered, the cover proved to be a great success. This book, by father and son authors Antony and James Clark, is intended to be a step by step guide to beginners on both the ZX Spectrum and the BBC Micro Computer, and as a teaching aid the cover folds into a readily accessible support for the inner texts. Having many times in the past all but lost concentration trying to type a listing into the computer while being continually frustrated by losing my place on the page, I found this simple and effective solution most convenient.

But let's not judge a book by the cover alone, what of the text that is so adequately supported? The book is aimed at beginners and assumes little more than that the reader has successfully set up the computer and glanced over the manual. I should dispute, however, that it is suitable for users as young as nine years, if for no other reason than that they at such an age are likely to lose interest very quickly in such a factual treatment of the problem. Readers who can sustain interest are intended, on completion, to be familiar with a full range of programming instructions and to be aware of their usefulness. The topics covered are strings, string arrays, input and assignment statements randomize, FOR .... NEXT loops, screen formatting and all commands necessary for their implementation. Also included are examples and hints on program writing and programming style.

New users will find that there is no shortage of books with similar material, so other than the novel binding, what have Messrs. Clark included to make their book worthy of any note? The strength of 'Self Instruct Basic' is not the content, which is no more than might be expected in an elementary book, but the method of presentation. From what I can remember of the hours I have spent close to sleep at the back of a lecture hall as a student teacher, the technique has much merit.

In each section there is an introduction to the topic, an example of its use and a short discussion to highlight and reinforce the principle. Further, there are suggestions for putting the newly discovered technique to use and questions to ensure that the theory has been properly learned. In the main though, this is a book to be used when sitting in front of the computer. Any computer user worth his 'chips' knows that hands on experience is the only way to develop skill — this book is intended to be used as a companion and guide while gaining that experience. It is a well structured course in basic programming and should be followed, as suggested, in the order laid out. To gain all the book has to offer the reader should be prepared to be a good student following that course and investigating the projects suggested. All that it has to offer is a good grounding in BASIC for both Spectrum and BBC users but that is no small task.

On first impressions 'Self Instruct Basic' may seem flimsy; but as a guide to new users it has my 'backing'.

'Self Instruct Basic a Practical Guide' is written by Antony and James Clark, published by Pitman and costs £4.95.
ISBN 0 273 02020X

Problem page



Our regular 'agony uncle', Peter Shaw, answers some more of your programming queries!

Thank you once again for your correspondence. I am always glad to help any readers with computer problems, although I am sure you understand that I cannot deal with *every* letter I receive. To start with, I have had about two dozen letters asking for the address of Fountain Computers Limited. I mentioned in a previous issue that Fountain produced a sheet called 'Improving the Spectrum Display' for £1. The sheet explains how to 'fine tune' your Spectrum to your television for the maximum colour output, but the minimum dot crawl. The method is not compatible with issue 3 machines. Fountain's address is; Darvill Road, Ropley, Alresford, Hants SO24 0BW.

Dear Peter
I am writing to ask you what the error report code H means. For after typing in a program on my ZX81 which included machine code this was displayed and it quite baffled me for it is not detailed in the ZX81 manual. Please could you enlighten me.

Darren Crook
Velindre
Wales

Darren
This is what's known as a crash. Usually with the average ZX81, crash looks much more hi-res-and-modern-art-mode, but this crash has somehow called the error report routine, and the report H has been thrown out because the report subroutine has been called in a non-standard way. What you must do is check the program listing with the machine code you already have in your computer. This is probably where the problem lies.

Dear Peter
I would be pleased if you could print a copy of the "Conversion Table", for converting ZX81 PEEK values to that of the Spectrum.

In various books I have seen such tables to convert ZX80 PEEK values to the ZX81, but I have not yet seen one for the ZX81 to Spectrum.

Although I have both the Spectrum and ZX81, I much prefer the ZX81 with 16K memory, as the programs devised for it are both short and sweet, not as long-winded and bug-ridden as Spectrum programs. Thus, the Spectrum lies neglected until I convert PEEK values from better programs for it.

J T Clench
Hall Green
Birmingham

Mr Clench
I took your letter as a challenge and sat down and worked out the necessary conversions. Here they are for the first time, as you and I believe, in print at last!

ZX81	SPECTRUM
16384	23610
16385	23611
16386	23613
16388	23730
16390	23617
16391	23617
16393	NO EQUIVALENT
16394	23621
16396	NO EQUIVALENT
16398	23684
16400	23627
16402	23629
16404	23641
16406	23645
16408	23647
16410	23651
16412	23653
16414	23655
16415	23656
16418	23659
16419	23660
16421	23560
16424	NO EQUIVALENT
16425	23637
16427	23662
16429	23665
16430	23666
16432	23668
16434	23670
16436	23672
16438	23677
16439	23678
16440	23680
16441	23688
16442	23689
16443	NO EQUIVALENT
16444	23296
16477	23698

Dear Peter
I read today about Sinclair's new computer, the QL, in another publication. There are a few points which seem a little unclear, and I would be most grateful if you could clear up these problems for me.

I am told that the machine has 128K of memory; how much is available to the user? There is an 'industry standard' monitor output. What type of monitor output is it, and how is it wired up? I have ZX Microdrives, can I plug them onto the QL? Finally, I have heard no mention of a cassette interface, and I cannot see one on the picture I have of the QL. Is there a cassette interface, and if so at what BAUD rate does it work?
Thank you for your help.

David Pryce
Heald Green
Manchester

David
The QL does indeed have 128K of memory, when you are in the high resolution mode you have 96K left. This is what I am told, but not something I have checked for myself. The monitor output is an RGB interface, which is wired up as follows;

1 RED
2 GREEN
3 BLUE
4 VSYNC
5 CSYNC
6 VIDEO (COMPOSITE MONOCHROME VIDEO)
7
8 GROUND

This should be compatible with most RGB monitors on the market providing you have the right cable.

Your ZX Microdrives, however, are not compatible with the QL. Sinclair have produced a slightly improved version of the microdrive especially for the QL. As for your last question, no, the QL doesn't have a cassette interface. Sinclair feels that as it already has two drives built in you won't need cassettes. Not good news for the independent software houses.

AGF

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MICRODRIVE COMPATIBLE

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You can use *any* Atari-compatible joystick controller with *any* software for your Sinclair Spectrum or ZX81, not just those with a joystick option.

Movement of the joystick is recognised by the computer *exactly* the same as pressing the appropriate control keys, and can therefore give the most immediate response to that movement. The hardware programmed design works with *all* possible key-reading methods, both BASIC and Machine Code.

Eight directional movement, with or without the fire button being pressed, can be achieved by only programming the left, right, up, down and fire keys required by the game.

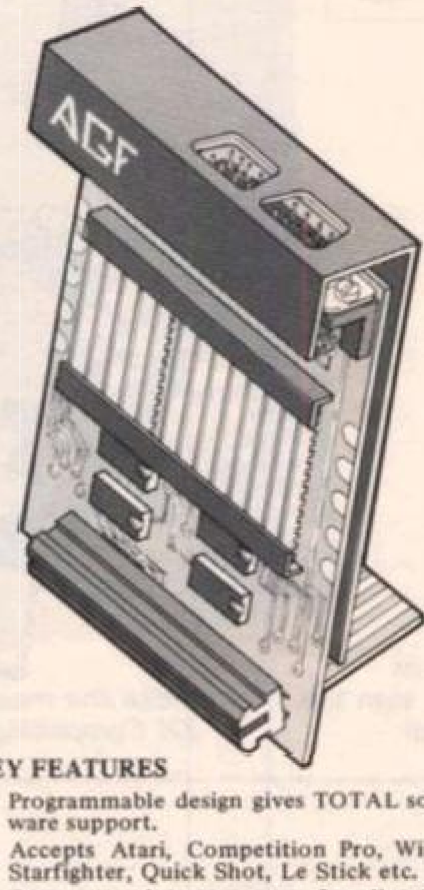
Programming is achieved by a two-digit code, which is looked up on the Programming Chart supplied, for each direction and firing button. These two numbers are then selected on a pair of leads which are clipped onto appropriately numbered strips on the interface.

Once configured this can be marked onto a Quick Reference Programming Card for storing with the game. As the programming is *not* power dependent the interface can be immediately used when next switched on.

The keyboard remains fully functional and can be used simultaneously with the joystick.

An integral rear expansion connector means there is no need to remove the interface to connect other peripherals.

NB. A recent design improvement now means that the AGF Programmable Interface works with the new Quickshot II rapid "Auto Fire" feature.



KEY FEATURES

- ★ Programmable design gives TOTAL software support.
- ★ Accepts Atari, Competition Pro, Wico, Starfighter, Quick Shot, Le Stick etc.
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Conversion tips

A guide to ZX81/Spectrum program conversions from David Nowotnik.

The versions of BASIC offered by the two ZX computers are so similar that many programs for one can be used by the other. The ZX81 has only two commands which are not present on the Spectrum, SCROLL and UNPLOT, and these should cause you few problems when converting ZX81 programs to the Spectrum (see Table 1).

There are quite a lot of commands and functions on the Spectrum which are not available on the ZX81. A list of these appears in Table 4. The stars indicate those commands and functions for which there is no simple translation to ZX81 BASIC. Those for colour and sound can be ommitted; but you will have to find some alternative for the high resolution and file I/O commands.

The command PLOT appears on both computers, but the effect is quite different, so beware! Another tip: PEEK and POKE should be used with caution. In conversion, addresses will almost certainly have to be changed. Some of those changes appear in the tables. A command such as POKE USR "a".... on the Spectrum indicates User Defined Graphics; ZX81 users don't have this facility, so you'll have to omit this and use a standard character instead.

ZX81	Spectrum	Comments
SCROLL	RANDOMISE USR 3582 or LET t=USR 3582	If the program uses random numbers, they could become rather predictable with the first option. If so, use the second, using a variable (in this case t) which is otherwise not used.
PLOT Y,X	PRINT AT 21−Y/2,X/2;	Print the appropriate quarter square graphics character.
UNPLOT Y,X	PRINT AT 21−Y/2,X/2;	Print a space, or the appropriate quarter square graphics character.

Table 1 ZX81 to Spectrum conversions.

Spectrum	ZX81	Comments
BIN eg LET y=BIN 10010101	LET y=(decimal no.) Conversion to decimal: 10010101=149 128 64 32 16 8 4 2 1 Add these numbers together when a 1 appears at the appropriate position in binary.	BIN allows the representation of a number in binary. On the ZX81 use the decimal equivalent, but beware; BIN is often used with User Defined Graphics, which are not available on the ZX81.
READ/DATA eg READ x,y DATA 50,60	LET LET X=50 LET Y=60	READ and DATA are used to store a lot of information in a program. Use LET instead.
DEF FN and FN eg DEF a(x)=SQR x LET t=FN a(i)	LET X$="SQR X" LET X=I LET T= VAL X$	The defined function can appear in a string. Use the keyword for built-in functions (eg SQR). The equivalent of FN may need 2 lines, as shown.
PLOT	no equivalent	
SCREEN$ eg LET a=SCREEN$ x,y	LET A=PEEK(PEEK 16396 +256*PEEK 16397+1+Y+33*X)	Used in interactive games to detect characters in the display file. Note — this formula only works when a RAM pack is fitted.

Table 2 Spectrum to ZX81 conversions.

ZX81	Spectrum	Comments
1 FRAMES POKE 16436,255 POKE 16437,255 LET T=(65535−PEEK 16436−256*PEEK 16437)/50	POKE 23672,0:POKE 23673,0 LET t=(PEEK 23672+256*PEEK 23673)/50 For times greater than 10 minutes, you can use byte 23674 as well.	Both computers have a counter which accurately varies by 50 every second. In the example, use the first line to start the 'clock'. The variable T will have the time in seconds after the start. The counter can only be used for 10 minutes.
2 Line number zero POKE 16510,0	POKE 23756,0 (As the start of BASIC can move, eg with microdrives) use with caution.	Converts the first line of a program to line number zero, which cannot be edited, and so is protected.
3 RAMTOP POKE 16388,X−256*INT (X/256) POKE 16389, INT (X/256)	CLEAR x	Creates a safe area at the top of RAM starting at address x, for storing data, machine code etc.

Table 3 General interconversion hints.

BEEP	*	FORMAT	*	ATTR	*
BORDER	*	INK	*	BIN	
BRIGHT	*	INVERSE		FN	
CAT	*	MERGE	*	IN	*
CIRCLE	*	MOVE	*	OVER	*
CLOSE	*	OPEN	*	POINT	*
DATA		OUT	*	SCREEN$	
DEF FN		PAPER	*	VAL$	*
DRAW	*	READ			
ERASE	*	RESTORE	*		
FLASH	*	VERIFY	*		

Table 4 Spectrum functions not available on the ZX81.

MACHINE SPECIFICATIONS

ZX80

Dimensions
Width 174mm (6.85 in)
Depth 218mm (8.58 in)
Height 38 mm (1. 5 in)
Weight 300g (10.5oz)

Microprocessor/Memory
Z80A 3.25 MHz clock
ROM: 4K bytes containing BASIC
RAM: 1K bytes internal, externally expandable to 16K bytes.

Display
Requires an ordinary domestic black and white colour TV. The lead supplied connects between the ZX80 and your TV's aerial socket. The display organisation is 24 lines of 32 characters per line showing black characters on a white screen. The ZX80 does not connect to a printer.

Programming
Programs can be entered on the keyboard or loaded from cassette. The ZX80 has automatic "wrap round" so lines of program can be any length but not multi-statement lines.

Syntax check
The syntax of the entered line is checked character by character. A syntax error cursor marks the first place the syntax breaks down if there is an error. Once any errors have been edited out the syntax error cursor disappears. Only syntax error-free lines of code are accepted by the ZX80.

Graphics
Total of 22 graphics symbols giving 48 x 64 pixels resolution consisting of 10 symbols plus space and inverses. Includes symbols for drawing bar charts. Under control of your BASIC program any character can be printed in reverse field.

Editing
The line edit allows you to edit any line of program or input including statement numbers. The edit and cursor control keys are EDIT, RUBOUT, HOME.

Arithmetic
Arithmetic operators +,–,x, ÷ exponentiate. Relational operators <, >, = , yielding 0 or – 1. Logical operators AND OR NOT yielding boolean result. Relational operators also apply to strings. ZX80 BASIC uses 16 bit two's complement arithmetic (± 32767).

Variables
Numeric variable names may be any length, must begin with a letter and consist of alphanumerics. Every character in the name is compared thus an infinity of unique names is available.

String variables may be assigned to or from, shortened but not concatenated. String variable names are A$ – Z$. Strings do not require a dimension statement and can be any length.

Arrays have a maximum dimension of 255 (256 elements) each. Array names consist of a single letter A–Z.
Control variable names in FOR. . . NEXT loops consist of a single letter A–Z.

Expression evaluator
The full expression evaluator is called whenever a constant or variable is encountered during program execution. This allows you to use expressions in place of constants especially useful in GOTOs, GOSUBs, FOR. . . NEXT etc.

Immediate mode
The ZX80 will function in the "calculator mode" by immediately executing a statement if it is not preceded with a line number.

Cassette interface
Works with most domestic cassette recorders. The transfer rate is 250 baud using a unique tape-recording format. Other systems are not compatible with the ZX80's. The ZX80 also SAVEs the variables as well as the program on cassette. Therefore you can save the data for updating next time the program is executed. The ZX80 does not support separate data files. The lead supplied with the ZX80 is fitted with 3.5mm jack plugs.

Expansion bus
At the rear has 8 data, 16 address, 13 control lines from the processor and Ov, 5v, 9-11v, Ø and internal memory control line. These signals enable you to interface the ZX80 to your own electronics, PIO, CTC, SIO if you want I/O ports etc.

Power supply
The ZX80 requires approximately 400mA from 7–11v DC. It has its own internal 5v regulator.

TV standard
The ZX80 is designed to work with UHF TVs (channel 36)and is the version required for use in the United Kingdom. The ZX80 USA is designed to work with a VHF TV(American channel 2. European channel 3) and is the version required for the American TV system, also for countries without UHF.

ZX81

Dimensions
Width 167mm (6.32 in)
Depth 175mm (6.80 in)
Height 40 mm (1.57 in)
Weight 350 gms (12.15 oz)

Microprocessor/Memory
Z80A 3.25 MHz clock
ROM: Containing 8K BASIC interpreter
RAM: 1K bytes internal, externally expandable to 16K bytes.

Keyboard
40 key touch-sensitive membrane. Using function mode and single press key-word system, this gives the equivalent of 91 keys and also graphics mode allows an additional 20 graphical and 54 inverse video characters to be entered directly.

Display
Requires an ordinary domestic black and white or colour TV. The aerial lead supplied connects the ZX81 to the TV aerial socket. The display is organised as 24 lines of 32 characters with black characters on a white background.

Two mode speeds
The ZX81 can operate in two software-selectable modes - FAST and NORMAL. FAST is ideal for really high-speed computing. In NORMAL mode however the ZX81 allows continuously moving, flicker-free animated displays.

Printer
The 8K ROM will permit instructions (LPRINT, LLIST and COPY) to drive the Sinclair ZX Printer.

Programming
Programs can be entered via the keyboard or loaded from cassette. Programs and data can be saved onto cassette so that they ▶

are not lost when the ZX81 is turned off.

Syntax check

The syntax of a line of program is checked on entry. A syntax error cursor marks the first place the syntax breaks down if there is an error. The syntax error cursor disappears when errors have been corrected. Only lines free from syntax errors will be entered into the program.

Graphics

Apart from the 20 graphics characters, space and its inverse, the display may also be divided into 64 x 44 pixels, each of which may be 'blacked' in or 'whited' out under program control.

Editing

A line editor allows you to edit any line of program or input, including program line numbers. Lines may be deleted, increased or decreased in size.

Arithmetic

Arithmetic operators +, –, x, ÷, exponentiate. Relational operators =, < >, >, <, <=, >=, may compare string and arithmetic variables to yeild 0 (False) or 1(True). Logical operators AND, OR, NOT yield boolean results.

Floating-point numbers

Numbers are stored in 5 bytes in floating-point binary form giving a range of $\pm 3 \times 10^{-39}$ to $\pm 7 \times 10^{38}$ accurate to 9½ decimal digits.

Scientific functions

Natural logs/antilogs; SIN, COS, TAN and their inverses;SQR; e^x.

Variables

Numerical:	any letter followed by alphanumerics
String:	A$ to Z$
FOR-NEXT loops:	A–Z (loops may be nested to any depth.
Numerical arrays:	A–Z
String arrays:	A$ to Z$

Arrays

Arrays may be multi-dimensional with subscripts starting at 1.

Expression evaluator

The full expression evaluator is called whenever an expression, constant or variable is encountered during program execution. This powerful feature allows use of expressions in place of constants and is especially useful in GOTO, GOSUB etc.

Command mode

The ZX81 will execute statements immediately, enabling it to perform like a calculator.

Cassette interface

Works using domestic cassette recorders. The transfer rate is 250 baud and uses a unique recording format not compatible with other systems. The ZX81 will save the data as well as the program to avoid the need to re-enter the data when the program is next loaded.,

ZX81 will search through a tape for the required program). The cassette leads supplied have 3.5 mm jack plugs.

Expansion port

At the rear, this has the full data, address and control buses from the Z80A CPU as well as OV, +5V, +9V, Ø and the memory select lines. These signals enable you to interface the ZX81 to the Sinclair 16K RAM pack and ZX printer.

Power supply

The ZX81 requires approximately 420mA at 7–11V DC. It has its own internal 5V regulator. The ready assembled ZX81 comes complete with a power supply. The ZX81 kit does not include a power supply.

TV standard

The ZX81 is designed to work with UHF TVs (channel 36) 625 lines.

ZX SPECTRUM

Dimensions

Width 233 mm
Depth 144 mm
Height 30 mm

CPU/Memory

Z80A microprocessor running at 3.5 MHz. 16K-byte ROM containing BASIC interpreter and operating system.
16K-byte RAM (plus optional 32K-byte RAM on internal expansion board) or 48K-byte RAM.

Keyboard

40-key keyboard with upper and lower case with capitals lock feature. All BASIC words obtained by single keys, plus 16 graphics characters, 22 colour control codes and 21 user-definable graphics characters. All keys have auto repeat.

Display

Memory-mapped display of 256 pixels x 192 pixels; plus one attributes byte per character square, defining one of eight foreground colours, one of eight background colours, normal or extra brightness and flashing or steady. Screen border colour also settable to one of eight colours. Will drive a PAL UHF colour TV set, or black and white set (which will give a scale of grey), on channel 36.

Sound

Internal loudspeaker can be operated over more than 10 octaves (actually 130 semitones) via basic BEEP command. Jack sockets at the rear of computer allow connections to external amplifier/ speaker.

Graphics

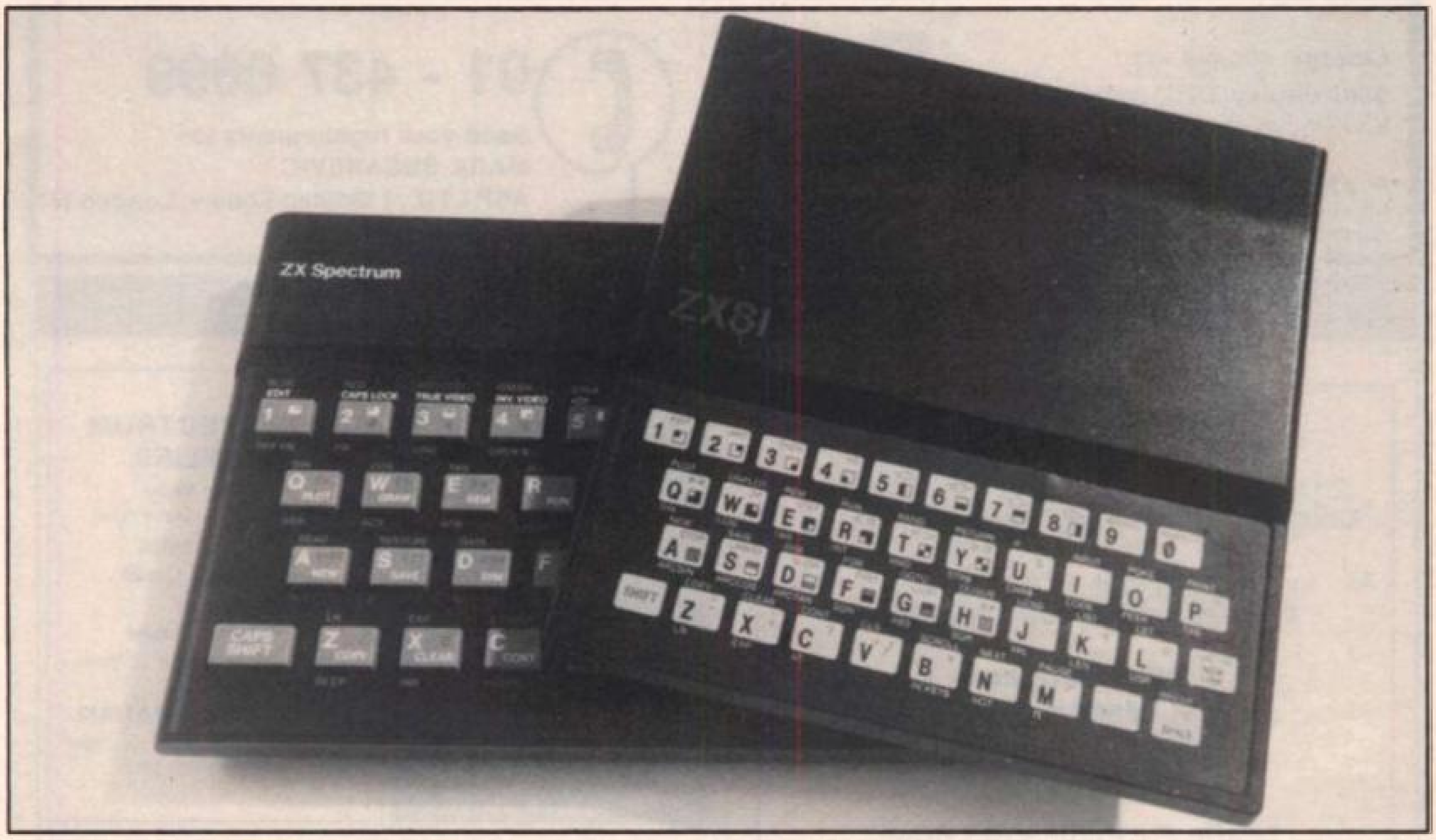
Point, line, circle and arc drawing commands in high-resolution graphics.
16 pre-defined graphics characters plus 21 user-definable graphics characters. Also functions to yield character at a given position, attribute at a given position (colours, brightness and flash) and whether a given pixel is set. Text may be written on the screen on 24 lines of 32 characters. Text and graphics may be freely mixed.

Colours

Foreground and background colours, brightness and flashing are set by BASIC INK, PAPER, BRIGHT and FLASH commands. OVER may also be set, which performs an exclusive – or operation to overwrite any printing or plotting that is already on the screen. INVERSE will give inverse video printing. These six commands may be set globally to cover all further PRINT, PLOT, DRAW or CIRCLE commands, or locally within these commands to cover only the results of that command. They may also be set locally to cover text printed by an INPUT statement. Colour-control codes, which may be accessed from the keyboard, may be inserted into text or program listing, and when displayed will override the globally set colours until another control code is encountered. Brightness and flashing codes may be inserted into program or text, similarly. Colour-control codes in a program listing have no effect on its execution. Border colour is set by a BORDER command. The eight colours available are black, blue, red, magneta, green, cyan, yellow and white. All eight colours may be present on the screen at once, with some areas flashing and others steady, and any area may be highlighted extra bright.

Screen

The screen is divided into two sections. The top section – normally the first 22 lines – displays the program listing or the results of program or command execution. The bottom section – normally the last 2 lines – shows the command or program line currently being entered, or the program line currently being edited. It also shows the report messages. Full editing facilities of cursor left, cursor right, insert and delete (with auto-repeat facility) are available over this line. The bottom section will expand to accept a current line of up to 22 lines.



Mathematical Operations And Functions

Arithmetic operations of +, −, ×, ÷, and raise to a power. Mathematical functions of sine, cosine, tangent and their inverses; natural logs and exponentials; sign function, absolute value function, and integer function; square root function, random number generation, and pi.
Numbers are stored as five bytes of floating point binary — giving a range of $+3 \times 10^{-39}$ to $+7 \times 10^{38}$ accurate to 9½ decimal digits.
Binary numbers may be entered directly with the BIN function. =, >, <, >=, <= and <> may be used to compare string or arithmetic values or variables to yield 0 (false) or 1 (true). Logical operators AND, OR and NOT yield boolean results but will accept 0 (false) and any number (true).
User-definable functions are defined using DEF FN, and called using FN. They may take up to 26 numeric and 26 string arguments, and may yield string or numeric results.
There is a full DATA mechanism, using the commands READ, DATA and RESTORE.
A real-time clock is obtainable.

String Operations And Functions

Strings can be concatenated with +. String variables or values may be compared with =, >, <, >=, <=, <> to give boolean results. String functions are VAL, VAL$, STR$ and LEN. CHR$ and CODE convert numbers to characters and vice versa, using the ASCII code. A string slicing mechanism exists, using the form a$ (x TO y).

Variable Names

Numeric — any string starting with a letter (upper and lower case are not distinguished between, and spaces are ignored).
String — A$ to Z$.
FOR-NEXT loops — A-Z.
Numeric arrays — A-Z.
String arrays — A$ to Z$.
Simple variables and arrays with the same name are allowed and distinguished between.

Arrays

Arrays may be multi-dimensional, with subscripts starting at 1. String arrays, technically character arrays, may have their last subscript omitted, yielding a string.

Expression Evaluator

A full expression evaluator is called during program execution whenever an expression, constant or variable is encountered. This allows the use of expressions as arguments to GOTO, GOSUB, etc.
It also operates on commands allowing the ZX Spectrum to operate as a calculator.

Cassette Interface

A tone leader is recorded before the information to overcome the automatic recording level fluctuations of some tape recorders, and a Schmitt trigger is used to remove noise on playback.
All saved information is started with a header containing information as to its type, title, length and address information. Program, screens, blocks of memory, string and character arrays may all be saved separately.
Programs, blocks of memory and arrays may be verified after saving.
Programs and arrays may be merged from tape to combine them with the existing contents of memory. Where two line numbers or variables names coincide, the old one is overwritten.
Programs may be saved with a line number, where execution will start immediately on loading.
The cassette interface runs at 1500 baud, through two 3.5 mm jack plugs.

Expansion Port

This has the full data, address and control busses from the Z80A, and is used to interface to the ZX Printer, the RS232 and NET interfaces and the ZX Microdrives. IN and OUT commands give the I/O port equivalents of PEEK and POKE.

ZX81 Compatibility

ZX81 BASIC is essentially a subset of ZX Spectrum BASIC. The differences are as follows.
FAST and SLOW: the ZX Spectrum operates at the speed of the ZX81 in FAST mode with the steady display of SLOW mode, and does not include these commands.
SCROLL: the ZX Spectrum scrolls automatically, asking the operator "scroll?" every time a screen is filled.
UNPLOT: the ZX Spectrum can unplot a pixel using PLOT OVER, and thus achieves unplot.
Character set: the ZX Spectrum uses the ASCII character set, as opposed to the ZX81 non-standard set.

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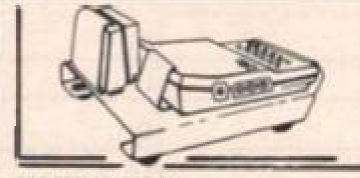
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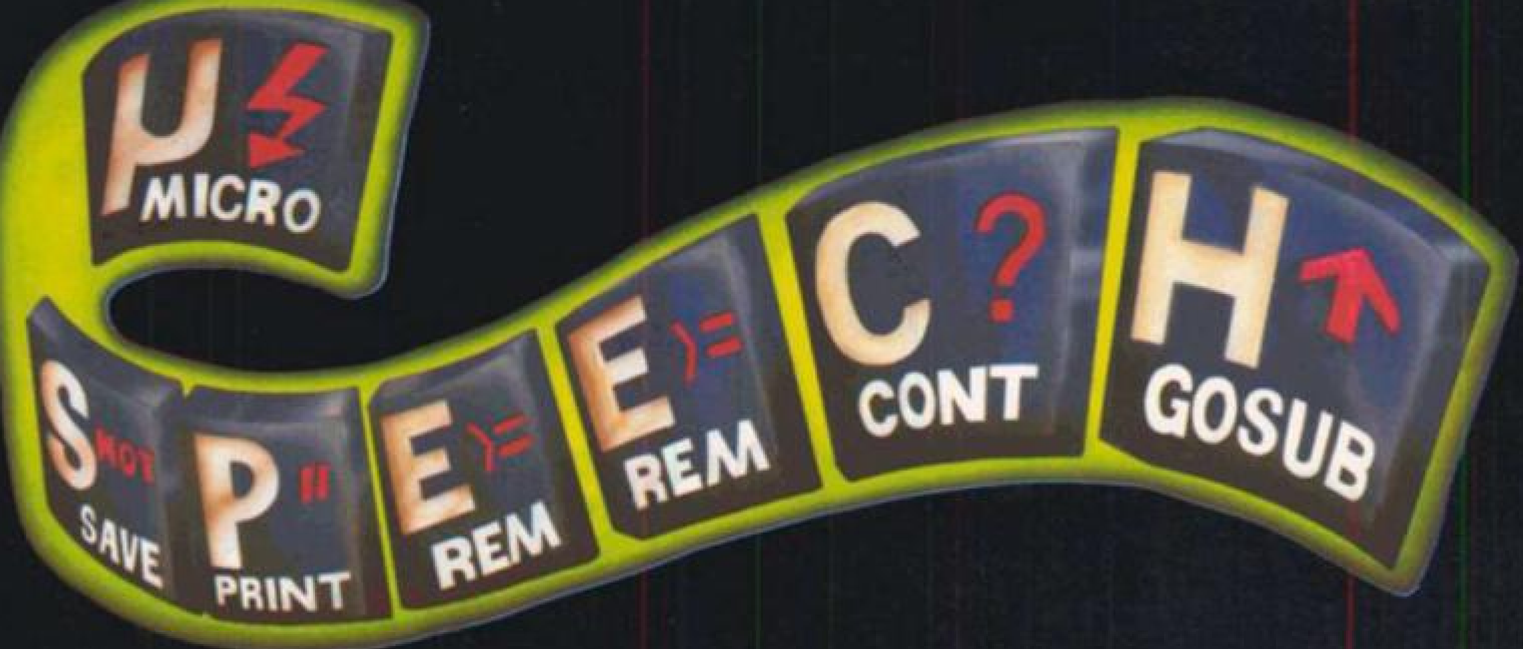
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